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# The Journal of Neurology and Psychopathology

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THE JOURNAL OF NEUROLOGY AND PSYCHOPATHOLOGY

Vol. XII. JULY, 1931. No. 45.

## Original Papers.

# THE AFFECTIVE NATURE OF ILLUSION AND HALLUCINATION. PART II: EIDETIC IMAGERY.*

By

EMANUEL MILLER, London.

Before we can fully appreciate the nature of hallucination as a disturbance in the mental life related to sensory experience, we are obliged to relate the phenomenon of non-experiential seeing to the true visual roots in actual neuro-psychological events. For this we must return to the visual sensory experience and its residua in after-images and so-called eidetic experiences. The whole nature of psychosis cannot be understood unless we relate it to the total field of neurological and psychological events. By so doing, the constitutional as well as the events historical to the subject will be taken into account.

The orientation in psychiatry to-day is towards the establishment of the constitutional factors on the one hand, and the tracing of psychological processes involved on the other. Constitution is a distractingly wide term, and may become a cemetery in which dead entities are buried—and perhaps the patient too. But in so far as we attempt to trace the elements making up a constitution and the biological processes involved in the concatenation of these elements, we will be the better able to prognosticate and to assign therapeutic measures of the necessary kind suited to a particular type.

On the other hand, the tracing of psychological histories will, apart from throwing interest upon mechanisms of instinct and emotion, relieve those tensions and correct such errors of perspective as have given rise to maladaptation and psychological collapse.

The shortcomings of this approach lie in the difficulty experienced by clinicians with a theoretical bent in accepting the universality, on the one hand, of psychic mechanisms and complexes, and on the other, the only partial distribution of psychosis and the eventual classes into which these psychoses fall.

(For Part I, Introduction, see this Journal, vol. VIII, 1927.)

*Read before the Section of Psychiatry, Royal Society of Medicine, and published here by permission of the Editorial Committee of the Society.

What determines psychosis at all ? What are the predispositions to this psychosis or that ? What makes for hallucinosis in some subjects, and yet not in others ? A new department of psychiatry has grown up in which relation of the physique to the psychosis has received particular attention. While there is a growing admission that the Kretschmer classification is unusually suggestive, it is felt that the bifurcation into cyclothymia and schizothymia is too sharp, and that while polar opposites of physique can be methodologically subsumed, psychic patterns are more complicated, and the streams of process involved in any mental unfolding are more interpenetrating than a simple dichotomy allows. Yet we all feel that some common process underlies physical and mental events, and that the conditions of human variability are governed by forces which cover, to some extent at least, the mental and physical fields.

There appears a need for some linking concepts which shall bind the two worlds together, yet allow them sufficient autonomy to pursue each their peculiar line governed by the character of the phenomenon. Concepts are bare, in the absence of concrete facts to give them covering. These concrete facts are not lacking. The hard facts of image psychology belong to both physiological and psychological worlds, and their careful experimental study supplies us with data for throwing light on the common factors involved in sense physiology and sense experience, and from sense experience we pass on to the specifically psychological world of image and mental constructs. The problem of imagery has engaged philosophers of the empirical type—a Locke, a Hume ; while Hartley was one of the earliest to give physical explanation which might satisfy neurologists. It is a nuclear problem because we have, in sense experience, one foot in the physical sense-organ and the other in mental process purely, which defies physical analysis. If, therefore, as thinkers accept a priori, and experimenters discover by observation, there is a transition from perception to mental construction, then we have a means of relating constitutional physical make-up with personal psychological history. The existence of intermediate imagery—eidetic imagery—seems to satisfy a need, yet its demonstrable nature allows for the clearer relating of mental and physical structures.

The burden of this paper is largely to suggest that in the eidetic image we have a phenomenon widespread in late childhood and early adolescence which bears certain type marks and is related indirectly to constitution on the one hand. On the other hand, it bears relationship to certain abnormal activities in the extreme case, and in its persistence into adult life it contributes an undertone to hallucinosis, which in itself is the substance out of which the total fabric of psychosis may be woven.

The demonstration of the existence of eidetic phenomena in at least a reasonable percentage of children gives the ground for relating this intermediate form of experiencing with hallucinosis, itself sufficiently widespread in psychosis and in itself closely related to the life of imagery in features which will be elucidated in what follows.

Urbantschitsch is regarded as the first to have isolated the type of image which has since been called the eidetic image. In addition to the visual image or memory image of visual character, we have the experience of actually 'seeing' the original object; whereas, in the former, the original object is imagined only, i.e., it is seen with the inward eye. He says: "The true eidetic image, in distinction to the visual memory image, revives the earlier optic impression when the eyes are closed in a dark room, and sometimes when the eyes are normally opened, with hallucinatory clearness." In the first place, therefore, these spontaneously *seen* images of a former percept must be distinguished from the hallucination and the dream, but it will appear that the existence of the latter is dependent upon the former, if not vice versa.

To obtain eidetic phenomena from children, a dark grey screen is used of white 50, black 310 on the colour wheel. The subject is given clearly to understand that what is expected of him is to state merely what he sees on this screen after gazing for a period of thirty seconds on a given pattern or picture fragment. In order to bring home to him what is meant by seeing, he is made to experience an after-image produced by gazing at a red square and then projecting the complementary colour on the screen.

He now knows what is meant by seeing as against imagining, and he also learns the habit of describing colour, intensity, outline, and size, when such features appear to him on the screen.

There is no doubt that when the child learns to realize the seen nature of the after-image, he has no difficulty in concentrating his attention upon the screen, and it is then that he sees things.

In my own observations, when eidetic images appear, they do so with a surprising spontaneity, whereas the after-image, because of its haziness and fluctuating quality, takes a little time before it is appreciated or worthy to be talked about. When eidetics are experienced the child will actually point to the screen and outline its characters as he describes them. In one or two cases it was described as actually swimming slightly above the paper, as if it were a definitely spatialized perceptual reality. Appreciation-detail too is a characteristic of the eidetic image, and totally unfamiliar objects such as foreign words unknown to the subject are spelt out with uncanny accuracy. In one case the emblems on a banner were seen in full detail and colour as part of a very complicated picture of crusaders before the walls of Jerusalem. To the boy, these objects were as real as an actual picture, partly, no doubt, because of the affective interest which had made the selection of the object possible.

In my own observations also I have noticed that in more than one example the seen complex was a mixture of both after-image and eidetic, that is to say, while part of the colours were described as complementary, other parts—and these more interesting in a complex way—were seen with perceptual detail and intensity in their true colours. Thus dual experience is of great theoretic import because it illustrates that the eidetic image is more richly supplied with psychical elements, that is, interest and affectivity. It also shows that as a

mental experience it makes of these optic events—of which the after-image is the most striking—merely a transparency, as if the mind had a direct contact with the external world as it does have in perceptual experience. But the fact remains that in all these experiences imagining cannot go on in the absence of some prior perceptual material.

In some children, however, the eidetic image does not appear at all, and the things seen are just the ordinarily detailed after-images. In others, again, the process of confabulation goes on apace, and immediately ; and the subject sees many other things than those which appeared on the original design or picture. These seem to be immediately activated, by the process of fixation, truly to hallucinate inner experience culled from memory and shaped by affective interest. Roughly speaking, it is the introverted child who immediately elaborates his perceptual experience and contaminates the eidetic experience with deeper subjective ingredients.

On the other hand, children of more ready rapport with externals had purer eidetic experiences, vivid in colour, clear in outline and more lasting in time. These, however, did not retain them after a repeated fixation, whereas the confabulation continued to have incorporated on the screen projective elements of the original percepts.

The subjects of purest eidetic experience were the younger of the series—that is, round about 10 and 11.

Dawes Hicks, quoting Taine's account of an English painter, says, " When a sitter came, I looked at him attentively for half an hour, sketching him from time to time on the canvas. I wanted him no more. I put away my canvas, and took on another sitter. When I wished to resume my first portrait, I took the man and sat him on a chair, when I saw him as distinctly as if he had been before me. I may say almost more vividly, when I looked at the chair I saw the man there."

Those who are accustomed to watch so-called imaginative children at play will have noticed how they will spatialize and move about their imaginary toys and persons, and will handle them not as make-believe things, but as eidetic experiences of things seen in the past but now in mental space, projected into the external world. Observation of patients with so-called lilliputian hallucinations brings home to us the kinship that these hallucinations bear to perceptual experience. Unlike some hallucinations which are vague and spatially poorly orientated, these can be highly coloured mannikins which are handled by the subject like real objects in the external world. One notices how psychotics will frequently remove imagined objects from the body indicating that they are seen things. Interestingly enough, like lilliputian hallucination, the eidetic image is also a reduced replica of its original as if the original percept were now seen through a reducing lens, clear in definition, and sometimes more vivid in colour than the percept from which it has sprung. I have myself experienced an eidetic image of a picture seen as a reduced but clear and vivid reproduction of the original, and a scene which I experienced vividly but for

a short time sprang back into present experience with such vividness of form and colour that I was able to reproduce it with sufficient accuracy to lead those who had shared my original experience to believe that I had sketched it at the time of experiencing it.

I have mentioned the fact that in intense eidetic experience the subject will point with deliberation at the screen image, outlining its contours, giving it what art critics call its tactile values, a matter of some moment in certain paintings, both modern and early Florentine, in which colour and perspective are intimately related. I believe this to be a matter of importance in that it gives to eidetic experience its particular perceptual tang. In the process of mental analysis, when infantile experiences are brought to mind, it seems as if an eidetic substratum of visual perception is again laid bare or activated. It seems as if the possibility of vivid recall of affect-loaded experience depends upon this type of retention. I believe it to be an irreducible condition of hallucinosis, certainly of visual hallucinosis. If we were equipped to deal with kinæsthetic experience in the same way as we can deal with experiences in the visual field, some such primitive experiencing as the eidetic would also be made manifest. In the auditory field one thinks of those untrained persons who will sit down to a piano and rap out a recently-heard melody with all its details and rhythmic quality. If this were a pure memory image, it would have become schematized and lack detailed accuracy; yet in this reproduction although whole passages may be forgotten, other passages, on the other hand, sometimes of complexity, are reproduced in all their detail. Charles Fox, of the Cambridge laboratory, experimenting with an incised maze, and blindfolded subjects, found that some succeeded in tracing through the maze almost at the second attempt. This suggests, at least, that in the kinæsthetic field, the same type of 'Anschauungsbild' is present. In such cases, where the subject does not describe a visual image of the direction traced out, it appears that a kinæsthetic image has been registered with an immediacy which we cannot attribute to memory in the strict sense of that term.

As regards *localization*, the eidetic image is found to be either belonging to the plane of the paper, but unlike the after-image it not infrequently seems to float above or in front of the level of the screen. Some believe that it takes on, and becomes distorted by, the character of the screen, but I have not noticed any peculiarity in this, except that when the image is not vividly coloured it tends to take on the grey colour of the ground, and in one case seemed to be a sort of intaglio carved in the ground. Unlike percepts, they follow the eye, but I have noticed an air of surprise on a child's face when experiencing them, unlike the vacant look of those who see with the inward eye alone, as in memory imaging or in day-dreaming.

As regards *clearness*, when a child is made to shut its eyes even in the midst of an eidetic experience, the details lapse and return when the eye is turned to the screen.

The *reaction time* of the appearance is extremely short in those whose eidetic imagery is sharp and clear, while there are others in whom at one and the same time both after-image and eidetic are struggling for dominance, or take up simultaneously different parts of the field. As regards clearness, there can be no doubt. Details of colour, form and outline are sometimes very acute indeed. As regards *selectivity*, there is always a tendency never to see the whole of complex pictures, but to see in detail a part, and at times the selected area has been found in one case to be surrounded by vague forms in complementary hues. Memory-images, however, are wider in extent, poorer in detail, and more schematic in general structure. Concentration, moreover, upon a memory-image—as in day-dreaming—will lead to their almost immediate disappearance. In this respect eidetic phenomena lack flexibility. For some time, I was pursued by the eidetic image of a picture in the National Gallery. It appeared miniature in size and floated about in space, appearing and disappearing clearly and in all its hues with all the insistence of a hallucination.

Many have registered the *flexibility* that occurs. Additions are made to the picture; there is transposition of parts. Analysis of the association in case brought out definite experiential facts which had an affective relationship to the subject of the eidetic experience. This introduces immediately the subjective ingredients in the eidetic experience. Some observers—Allport in particular—have made the subject move parts from and about the picture illustrating the conative trends that enter into and fructify the fundamental eidetic experience. This element of suggestibility needs careful assessment.

The *plasticity* of eidetic imagery is influenced by previous experiences. I have noted how a series of after-images given before a complex pattern is displayed will be the occasion of the latter appearing in detail but in complementary hues.

I have noted above how the size of the eidetic image tends to be a smaller reproduction of the original, but there are others who say it will vary in size in accordance with the subject's distance from the screen. Allport, however, has shown that if memory-images over long intervals are obtained of previous percepts they tend to become proportionately smaller in size. We have all noted how children will tend either to diminish in a most pronounced way the size of drawings or increase them enormously. The tendency to microptic hallucination has been noted by Dr. Kinnier Wilson in temporosphenoidal tumours, and the phenomena of lilliputian and brobdingnagian hallucination in the insane are well known. I have noticed such experiences occurring in actually perceptual experience. The objects of the external world have become either very small, or sometimes very large—and these were not memory-images or eidetic, but subjective modifications of the external world. In a particular case recorded by me some years ago, memories of childhood returned obsessively with painful accuracy in form and colour, so much so that one is obliged to concede to an eidetic background plus affective tone the responsibility for their continued existence.

Although I have not been able to investigate the character of *fusion* of eidetic imagery, one can see, in the experiments of Jaensch and Kroh of superimposed eidetic images of allied forms, the birth of genetic images, and thence of imaginal schemata. This point, however, is of no direct psychopathological importance.

I feel that the study of epileptic visual auræ will throw a light upon imagery on the one hand and general auræ on the other. In the case of an epileptic aura, which consisted of a pattern very reminiscent of the emergence of the blood-vessels from dark discs in complementary colours, we have obviously an after-image aura with no subjective component. But in the case of a young man who merely saw the white letters—I E L D S—on a blue ground clear and invariable, we have something suspiciously like the eidetic image. These letters proved on psychological investigation to be a pre-epileptic recurrence of an actual experience. The subject, when seven years old, was travelling on the Great Eastern Railway when a homosexual attack was attempted by a man in the same carriage. The train was passing London Fields station at the time and the window frame obstructed all but the letters I E L D S as the frightening experience took place. Affectively charged, this experience was repressed, and nothing but the fragment remained to be the prelude to a convulsive attack. It is difficult to accept this visual experience as a neural fragment. So circumscribed and vivid a visual experience cannot be regarded as the result of stimulation of a hypersensitive neural area in the cortex. There is not the slightest evidence for supposing that history is stored in the cortex in this way. We know from the study of aphasia how words are restored to language under the stress of emotion. Aphasics, otherwise inarticulate, can swear very satisfactorily, and whereas words alone appear to be lost, they are spoken when part of a whole sentence. Such occurrences seem to me to show the necessity for a psychological and not a neurological explanation of at least certain aspects of aphasia.

The phenomena of eidetic imagery yield a type of experience that lies midway between percept after-image and subjective recall or memory-image. They yield a substratum or undertone which supports all subsequent subjective modification, affectively charged. One might even venture so far as to suppose that the image-making function of mind is what gives meaning to percepts, if it does not actually manufacture them. Imaging and conation seem to go hand in hand in the establishment of rapport with the external world, perceptual process being the means of bringing to the organism those specific objects of the external world which supply its basic needs. The integrated organism is one in which this rapport between the inner world of mental forms and the outer world of things is made possible by the synthetic process of active experiencing. Without this conformity, normal psychoneural life is impossible. The eidetic image is a biological process which links external physical reality to the neural mechanisms and the world of mental forms. In children the differentiation of inner and outer has not yet become marked off and the rich

fantasy satisfaction of child and artist and insane is a manifestation of this process; it makes empathy possible. The eidetic image is the appearance of an event in the process of introjection, in that it retains the qualities of perception, yet makes a way for the elaboration of memory imagery, which bear more distinctly the marks of subjectivity.

That eidetic imagery is not invariably distributed may be a weak point apparent in this argument. But while the eidetic occurs only in 60 per cent. of investigated children, it may appear, as Jaensch has shown, in different types. As he alleges to have discovered, there are types of children—the *basedowian* and the *tetanoid*—who show differences in eidetic experience, and that feeding with calcium will modify eidetic intensity. We have, therefore, grounds for supposing that in some persons the passage from perception to memory-image is imperceptible, and no eidetic stage is detected. This may indicate a difference of imaginal type which, as our illustrations above suggest, may prove of value in psychiatry. That is to say, there exists an imaginal type of experience which in some persons has a vivid existence in childhood, and in others may persist through life. In such persons the growth of experience must suffer some sort of modification.

The patient actually re-enacts infantile scenes and experiences, and even when these are fantastically elaborated they retain a factual core. That their retention is affectively determined is no light contention, for we find that these associated images are strung very persistently upon conative threads stretched to breaking-point, or transposed (as eidetic images are) by cross-currents set up by mental conflicts.

We are aware from the study of the insane in the light of affective psychology that hallucinosis is the compulsive appearance of image systems under the stress of emotion. But little time elapses between the sensory experiences of the night arising from the inner organs and the organs of sense, and the production of complicated dream structures. We have to suppose that, as Bergson has pointed out, the retinal designs of hypnogogic illusions are woven into dream fabrics in accordance with the conative trends of the dreamer. We have to suppose that in the continued dream life of the insane, the inner world of subperceptual experience, the eidetic image is fabricated into the structure of hallucinosis.

For the elaboration of psychical life from its very inception, perceptual experience is necessary; for our continued existence, imaginal construction is essential, but the passage must be smooth from percept to memory before healthy integration can take place. Persistence of mind residua will afford regression points for the construction of an assimilated experience. The more there exists within the mind un-assimilated residua, the greater will be the difficulties of mental integration. In the psychotic, this lack of psychic synthesis is a function of constitutional anomalies on the one hand, and of deep psychic conflicts on the other. The proportion of these etiological factors can only be determined by the close examination of the particular case. While

the persistence of primitive imaginal process is no proof in itself of psychotic tendency, we are led to the speculative conclusion that it interferes with integration, although, as in the artist and the otherwise normal person, the eidetic experience can be, by specialized synthesis, the source of productive activities.

The biological import of the eidetic image has been well stated by Allport:—

> "The function of the E.I. seems to be to preserve and to elaborate a concrete stimulus situation in such a way as to intensify for him the sensory aspects of experience. By so doing it enhances further for him the meaning of the stimulus situation and enables him to repeat and to perfect his adapted responses."

But the persistence of these concrete images at the expense of schema formation interferes with integration of the world of general notions upon which intellect and the education of relations rest. Their persistence is usually compulsive in nature and allows for the formation of psychical concretions affectively laden yet isolated from the stream of mental processes and therefore subject to complex formation, projected as visual imagery, thus becoming the mother substance of hallucination.

Particularly in schizophrenia are we witness to the hold which archaic forms have upon the mind, and these are largely imaginal in quality. We cannot, as Bergson suggests, believe that memory images are always as real as percepts. This is prone to occur in some artists, who use not only the canvas for their projections but the written word. In others, the sowing of early eidetic experiences may provide a seed from which hallucination may grow.

Those who are at all acquainted with analytical procedure will have been struck by the broadly established two types of subjects who associate upon indirect verbal restatements of experiences, and those who fall into a stream of infantile imagery, though much of this imagery is fantastic in structure. This fantastic stream of association is sometimes very vivid in its content, and there are times when the imagery cannot be regarded as other than imaginal with a definite perceptual objective basis in fact. Events, as we say, are re-lived with extraordinary memory of the past and can be as vivid as actual perceptual experience. As Stout points out, the lightning stroke and the shriek of a steam whistle can never be reproduced in imagination. But in the eidetic experience, perceptual quality is in part retained, and should such a propensity persist we have the basis of a subsequent hallucinatory experience which can be as intense as, and even more disturbing than, the events of the external world. True, the affective accompaniment is what gives such hallucinatory experiences their terrifying, or sometimes gratifying quality. But in so far as they almost invariably refer back to some perceptual experience, we are obliged to postulate the existence of an image function which acts as a reality core for them. Regression invariably is a recoil to infantile mental function. Fixation at various phases of pregenital life is the favoured psychoanalytic explanation of the varieties of psychosis. But we are obliged to ask why regression takes place at all, and why at these stages, seeing that we all pass through the same psychological vicissitudes. Some constitutional factors

must exist to account for the stereotyped forms of psychosis. Kretschmer has given us psycho-morphological moulds into which the types of insanity fall. We seem, however, to be in need of certain link-conceptions which bind morphology to the psychical life—links which depend upon psychological as well as physiological factors, and which will, in addition, explain the occurrence of the outstanding psychical manifestations. Jaensch has shown how the eidetic functions according to type, and according to metabolism, as calcium feeding makes clear. Hallucinosis is an outstanding feature of psychotic life, yet occurs intermittently in normal persons.

In the eidetic image function we appear to have a process which supplies at least one of the undertones of psychosis.

The aim of these notes is to see what further can be known of the structure as well as of the dynamics of psychosis, but in order to substantiate on scientific lines the value, if any, of suggestions brought forward, a comparative inquiry is suggested. Thus it is desirable : (1) To standardize the test methods under psychological and biologically varied conditions ; (2) to establish the relation of eidetic experience to perseveration ; (3) to study the frequency, in satisfying numbers, of eidetic experience in psychopathic and non-psychopathic children ; (4) to establish the frequency and kind of eidetic images in cases of chronic and intermittent hallucinosis ; (5) to determine the differentia of eidetic phenomena in persons of recognized schizothymic and cyclothymic make-up respectively, and the extent to which richness of verbal imagery tends to destroy or to be poorly correlated with the appearance of the eidetic phenomena.

**SOME EXPERIMENTAL DATA ON AFTER-IMAGES AND EIDETIC IMAGES**

Each child sat in front of a grey screen at a distance of three feet, and in front of this coloured forms on sheets of the same grey were placed for a period of twenty seconds.

Each child was given a preliminary simple coloured rectangle 3 ins. by $\frac{1}{2}$ in. in order to make him realise the meaning of an after-image and what was meant by ' seeing something on the screen.'

| Case 1. | *Subject's Reply* : |
|---|---|
| *A green line.* | A green line—now violet, fades out after 15 seconds. |
| *Blue ring with green frame.* | A greenish-blue ring inside, frame is still green. No, now it is green-red. Points to screen to shew where it is. |
| *Blue circle with green centre.* | Green circle with blue centre. On the top there is a face with a little light. The blue is pale. The green is getting a bit lighter. |
| *Yellow four-petal flower, green stalk, red pot.* | Flower is brightest, it is pale blue. The stalk is pale green. Flower is now dark blue with reddish-green centre. The pot is orange and is getting fainter and fainter. |
| *Yellow cruciform flower, green stalk, red pot.* | A blue pot, the stalk is green. It goes up and curves like this. Bluish-grey flower, flower-pot is dark blue, flowers fading away. A bit of pot is left. (After 40 seconds.) |

| | |
|---|---|
| *Ship, red sails with number on. Yellow hull, blue water.* | Green sails with a red boat. Sees letters $Y_3^1$ in red on sails. Ship is blue now and sea is violet. Red ship behind the boat (subjective). Ship is turning greyish-red. |
| *A large pink pig in front of farmhouse, red roof, yellow walls. Green tree. Orange windows. Green path.* | A house and a green pig, yellow path and a tree on the path. Green leaves and brown trunk. Two orange windows. House is greyish-red, windows getting dark brown. |
| *Red bus with blue windows, inscribed RUNDFAHRT in black, on yellow road. Three green trees.* | A bus riding along a road which is yellowish-red. Bus is brownish-grey with green windows. Has written on it RUNDFAHRT—spells letters. Tree is reddish-grey and trunk is green. Bus is brown all over. The path is yellow now and fading away. |
| *A leafy tree with red fruit, two rabbits on the ground. Birds in leaves.* | A tree with leaves and at the bottom a fox and a brownish-grey rabbit. A yellowish-red tree trunk, has red apples. Leaves are green; birds are brownish-grey. (Original—pink.) Wings are yellow. Greenish-grey fox and rabbit stay longest. The fox is greyish-brown. The rabbit is getting yellow as he goes. |
| *Picture in great detail of Crusaders, mounted and foot, besieging a city* | Soldiers fighting on a crusade. They have crosses on them. One soldier on a horse; its head has a shiny breastplate, horse is grey. There is a shield with a cross. The flag near has three golden crowns and a lion on top. Flag is brown and lion is yellow. Two soldiers with helmets on head, and some lying dead. One castle brown and one yellow. (Points to them.) A lot of soldiers behind, many not on horseback. Here is a knight on horseback with soldiers behind him. Near him a soldier with a flag with three crosses and yellow lion. Soldiers have crosses on their arms. There are two castles. |

The subject was eight years old. Intelligence quotient 130. Bad temper at home, unmanageable. Father hysterical, ? cyclothymic.

Observations illustrate frequent mixture of after-image and reproduction of original colours. Forms are always true to the originals. Where pictures are more complicated in detail, imagery appears more intense and more approximate to original colours. For example, although the bus appeared partly in complementary colours, the small black lettering of unfamiliar word was spelt out correctly and spontaneously. Crusader picture was given in accurate detail and in fragments independent of literary nature of general theme. Subjective intrusions comparatively rare.

CASE II. Age 14. I.Q. 107. Solitary, introverted boy Attacks of bad temper and stealing.

| | |
|---|---|
| *Green line.* | Gives black line. |
| *Black square.* | Twice size. No sign of red in it. |
| *Green and blue concentric circles.* | Purple spot with dark purple in centre. A.I. Can't see top now. |
| *Green leaf.* | Greyish green leaf seen half size. |
| *Red bus, yellow road, green trees.* | Greenish blue lines—no details. Greenish blue horizontal line. |

| | |
|---|---|
| *Tree in fruit.* | Blue line with specks on it. Nothing with eyes shut. |
| *Crusaders besieging a city.* | Pause 45 seconds. Officer on a horse. Sees a white horse—man with battleaxe in raised hand. When ordered to shut his eyes immediately after exposure—'I simply saw dark outlines in my mind.' |

*Observations:* An obstinate and suspicious subject who feared something was about to be discovered by a trick. No evidence of eidetic imagery. Poor powers of conveying after-imagery.

CASE III. Age 14. I.Q. 95. A boy with anxiety hysteria. Tic of shoulder. Pronounced mother-fixation, and hallucination of being followed and tapped on shoulder.

| | |
|---|---|
| *Green and red concentric circles.* | After-image of green and red circles. |
| *Yellow ship, red sails with letters on one sail.* | Greyish after-image of a ship. |
| *Red bus, yellow road, green trees.* | Greyish after-image of a green bus with blue under it. No detail. |
| *Crusaders besieging a city.* | A grey knight with his hand held up and holding an axe—he is shouting. |
| *Wallflowers in a pot.* | Grey flowers in a pot with straw round it. (Makes criss-cross gesture in pointing to images.) They take some time to come and a longer time to disappear. |

*Observations:* A case in which detail again is remembered, whereas simple, boldly coloured patterns produce their after-images only. Here again the picture with much subject matter is imaged in some detail.

An *eidetic subject* with some anxiety about the experiment.

CASE IV. Age 15. I.Q. 95. Stammerer. Creates domestic disharmony. Dissatisfied and obstinate. Cannot settle to any work. Hyperkinetic type.

| | |
|---|---|
| *Green and red concentric circles.* | Gets after-image of red and green circles. |
| *A ship with red sails on a blue sea.* | Sees a green yacht. |
| *A green, leafy tree with brown trunk.* | Sees a tree with brown stem. |
| *Crusaders besieging a city.* | Sees nothing. |
| *Wallflowers in a pot.* | Sees nothing. |

*Observation:* Non-eidetic.

CASE V. Age 9. I.Q. 100. Backward in class. Day-dreams.

| | |
|---|---|
| | Traces with finger—up, down, etc. Some colour. What colours? Bright—'Same as it is.' What was it? Green. |
| *Red circle, green square border.* | Green given. *Yellow* square 'so thick' and red centre. Smaller than given—sharp edges—you can put your finger down it. After-image yellow. *Mauve* half circle, red. Accurate outline. Blue. Greenish round outside. Green after-image red spot. Blue with greenish in middle. Darker green 'coming round middle' spot. |
| *Yellow flower, green stalk, red pot.* | Orange here, middle is red, stalk is green, pot is red. Finger traces—'Bright colours.' |

| | |
|---|---|
| *Yellow star flower, curved stalk, red pot.* | Draws shapes of (5) and (6). Orange petals,—red—green stalk, red pot. Half size and stalk short. |
| *Yellow petals, green stalk, red centre.* | Eight things like this—red in middle, stalk green. Actual size. Orange round here, red in middle, stalk and pot. Stalk actual size. |
| *Geometric form in black on white ground 15 in. :—* | |
| (1) Two circles joined by a line and two strokes converging to a line. | Traces out accurately, with finger, on blank paper. |
| (2) Asymmetrical design of triangle with circle at one angle and rectangle at other angle. | Traces out image accurately on paper held at a distance. |

*Observation :* An *eidetic subject.*

Case VI. Age 8. I.Q. 100. Indolent at school. Interested in all sorts of odd subjects: chemistry, etc. Pilfers at home.

| | |
|---|---|
| *Green line.* | Purple after-image. |
| *Yellow flower in green pot.* | Sees stroke—then letters. Sees H. |
| *Yellow half circle, red pot.* | Sees face—dog or bear. 'Of course I didn't see that—you took it away.' |
| *Dog's head in profile (red).* | Monkey face, and his hand and his body. |
| *Head of a man in profile (red).* | Shakes head. Nothing. Father Christmas. 'There he is. There is his face and there is his hat—no, it's a woman or a man of some sort.' |
| *Profile of bird's head in red.* | Nothing—no, a woman with hands hanging down. |

*Observation :* Constant intrusion of subjective elements disguising results.

# HYPERVENTILATION EXPERIMENTS DURING $CO_2$ AND $O_2$ INHALATION IN PATIENTS WITH CONVULSIONS.*

By

MOGENS FOG AND MAX SCHMIDT, COPENHAGEN.

SINCE Foerster's method of hyperventilation taught us how to provoke epileptic seizures in epileptics at will in a far larger percentage than by any other method which could be used clinically, a number of investigations have been conducted in order to find out which of the changes that arise in the organism during hyperventilation must be considered the cause of the fit. Even though there is general agreement that on hyperventilation the epileptic fit is caused by a non-specific factor—and therefore it must not be expected that its study will lead to the discovery of the more intimate pathogenic factors of the epileptic fit—it is all the same of much interest to ascertain to which change the epileptic organism reacts with a seizure when the patient hyperventilates.

Georgi and several others lay the main stress upon the alkalosis which is the result of the intake of $CO_2$ through respiration, and on the shifting of ions and changes in colloid-chemical conditions in the blood, which take place at the same time. Others, and among these Foerster, put down the primary effect to the change in circulation, especially a vasoconstriction of cerebral vessels. In Denmark Hendriksen has advanced the hypothesis that vasoconstriction during hyperventilation is a reaction to the fall in blood-pressure which practically always takes place and that vasolabile epileptics are the first to exhibit the reaction. Lastly we must reckon with another factor, viz., that the 'psychic trauma' represented by the hyperventilation may play a releasing part, exactly corresponding to the well-known fact that emotional disorder may cause fits in epileptics.

## TECHNIQUE.

We have therefore tried whether, by submitting epileptics to hyperventilation under such conditions that alkalosis does not arise, it is possible to prevent the occurrence of fits. If this were the case, it would plead in favour of the idea that the alkalosis is the releasing factor—if fits occurred none the less, the theory of alkalosis might be taken for disproved.

In order to prevent the alkalosis, we allowed the patients to inhale $CO_2$ in different concentrations. Several investigators have had this idea, but we

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have not been able to find in the literature a corresponding systematic series of experiments, carried out on human material.

We do not consider it a serviceable technique to increase the $CO_2$ concentration of the inspired air by letting the person reinspire the expired air, as Lennox and Cobb have done a few times. In these experiments one is working with an unknown concentration of $CO_2$, and it must also be remembered that an experiment of fairly long duration will cause an anoxæmia, which is not without significance.

For the experiments we have therefore employed an apparatus which we use in cases of carbon monoxide and other intoxications, and which is a completed and somewhat modified Haldane oxygen-apparatus. Through this apparatus a certain concentration of $CO_2$ is inhaled, the rest being pure $O_2$; the tension is low, it being possible to regulate the delivery in such a way that the accumulation bag is exactly filled in the expiration pause. Through this an overpressure of any significance is avoided, and this is of importance, it being the partial tension of the gases and not their percentage in the air of the alveoli which decides their relative quantity in the blood. Expiration takes place through a valve on the mouth-piece.

We soon came to see that, by letting the patients breathe through a mask, more conditions than those determined by the gases inhaled are changed.

First of all the psychic attitude of the patients towards the experiment is surely different from what it is during simple hyperventilation. Moreover it must be taken into consideration that the conditions of pressure in the thorax, and through these the blood-pressure, are changed during respiration under a certain pressure. Therefore, as a sort of control, we allowed some of the patients to inhale pure $O_2$. Thus some have been tested with simple hyperventilation and with $CO_2$–$O_2$ inhalation, others with simple and with $O_2$ hyperventilation, and some have been tested with all three methods. For other reasons than pure control the testing of hyperventilation during inhalation of pure $O_2$ is of importance. In their monograph on epilepsy Lennox and Cobb mention—rather en passant—that both by inhalation of $O_2$ and of $CO_2$ they are able to prevent hyperventilation from causing fits in one single or some few cases—it looks as though they have not tried with more. It might therefore be maintained that the difference which appeared in our experiments on simple and on $CO_2$–$O_2$ hyperventilation was due to the oxygen in the latter method, and not to the addition of carbon dioxide.

Thus our method has been, either on the same day, or more often at an interval of one or two days, to hyperventilate the person in question with two or three of the methods. At times we first used simple hyperventilation, at other times first one of the other methods, in order to exclude that possible anxiety the first time the experiment was carried out might influence the results. It turned out, however, that the occurrence of fits was quite independent of whether it was the first or second time the patients were examined. Most often the patients were lying down, sometimes they sat up, but this does

not seem to influence the results. The time of day varied, but we have not been able to prove any relation to meals in the cases in which fits occurred. Otherwise the technique was the one generally used for hyperventilation. In the carbon dioxide experiments we used different concentrations—from 5 to 15 per cent., usually about 10 per cent.

On account of irritation of the respiratory centre, an increase in the frequency of respiration takes place during $CO_2$ inhalation, similar to the increase spontaneously exhibited by the patients during simple hyperventilation, but often somewhat quicker. The patients were asked, as far as possible, to breathe during the inhalations exactly as they did during simple hyperventilation—very deeply and a little quicker than normally, but without any great effort.

## RESULTS OF EXPERIMENTS.

We will not describe the course of the experiments in detail; it was the same as has so often been described in recent literature, and a series of the same symptoms as others have described, appeared.

As is always the case at a psychiatric department of the same sort as the clinic for mental diseases at Kommunehospitalet, the material at our disposal was very mixed. We have examined epileptic cases of a fresh, incipient kind, as well as old, demented cases with typical seizures. We also included a group of patients with doubtful attacks of convulsions, with epileptic 'equivalents,' or with badly observed seizures, in order to reach, perhaps, a diagnostic conclusion. Lastly we included a smaller number of patients with obvious hysterical convulsions, partly because these patients on extraneous provocation so easily give their emotion outlet in the shape of 'convulsions,' and therefore must form an excellent control-material as regards the purely psychical influence of hyperventilation; and partly because we hoped to find amongst them 'emotional epileptics,' corresponding to Guttmann's restriction of this conception, and thus get a chance of following these patients under the different experimental conditions. We regret to say that in no case did we succeed in provoking such 'emotional epileptic' fits as Guttman has done several times.

Within our group of epileptics, there are 20 patients in all; 15 cases belong to so-called genuine epilepsy, two are encephalitic, one is definitely and one doubtfully traumatic, and one is due to syphilis of two years' duration, which most likely has caused convulsions through a meningeal process.

As may be seen from fig. 1, in which we have put down our results graphically, we have in all made 71 experiments on 34 patients. In 10 experiments—on seven patients in all—we succeeded in provoking epileptic phenomena. In percentage this approximately corresponds to the results of a series of other investigators of recent years, being about 20 per cent.

The epileptic phenomena which have been put down in the Table as 'fits' are partly convulsions—thrice in epileptics on simple hyperventilation, once in a patient with doubtful epilepsy (the diagnosis *before* hyperventilation);

partly 'absences'—once in an epileptic on simple hyperventilation, twice on $O_2$ hyperventilation, once on $CO_2$ inhalation; and lastly, in two experiments with simple hyperventilation, 'psychic equivalents' were provoked in one epileptic, of the same character both times, and resembling similar fits in the historia morbi of the patient.

We cannot here enter into the fits of each single patient, or other details. We have of course only counted what we reckoned as definite epileptic mani-

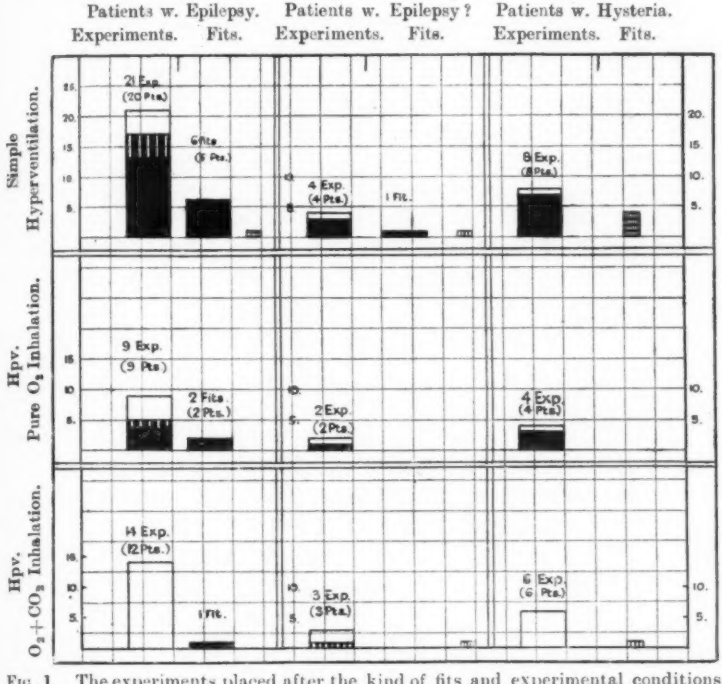


FIG. 1. The experiments placed after the kind of fits and experimental conditions. The columns to the left indicate the number of experiments. The black part of the column marks the number of patients with pronounced tetanic, the streaked part the number of patients with less pronounced tetanic phenomena during the experiment. The columns to the right indicate the number of patients who produced epileptic fits during the hyperventilation experiment. The slender columns farthest to the right show the number of functional reactions.

festations. In most cases the fits have occurred in a period in which the patient had many fits, or at a time when, according to the usual interval between the fits, spontaneous fits might soon be expected, but this rule has not been quite without exceptions. In the patient in whom we most often—in four out of five experiments—provoked epileptic phenomena, these fits were the only ones observed during his stay at the department. At the same time we might mention that this patient had a fit during one of his $CO_2$ experiments, a result

to which we will return later, and which we will so far keep out of the discussion. *In all other cases fits failed to appear on inhalation of the $CO_2$ mixture, including patients in whom they otherwise appeared—spontaneously—with great frequency.*

Hence, as may be seen from the Table, this is our chief result: that with $CO_2$ inhalation it is possible to prevent fits from occurring, while otherwise they appear both on simple hyperventilation (seven fits in 25 experiments on epileptics and on patients with doubtful epilepsy) and on $O_2$ hyperventilation (two 'absences' in 11 experiments on patients of the same category).

Furthermore, it may be seen from fig. 1 that in a series of cases psychical reactions have been provoked in the patients—most often crying or exaggerated 'functional' exhaustion and lamenting. As was to be expected, these reactions are most frequent in patients with hysteria and in those cases of epilepsy that are doubtful and in which the diagnosis mostly turns towards hysteria. Only once was a psychical reaction provoked in a genuine epileptic—reacting on a tetany fit. We cannot venture, on the basis of so scanty a material, to draw any conclusions as to the differences under different experimental conditions—the reactions are most likely purely unspecific reactions of fatigue.

## PHENOMENA OF TETANY.

Before we discuss further the conditions for the appearance or non-appearance of epileptic phenomena during our experiments, we may make a few remarks on the tetany phenomena, which we otherwise will not discuss more in detail in this paper.

It can be seen clearly how the phenomena of tetany—appearance or increase of the facialis phenomenon, paraesthesiæ, muscular phenomena, spasms, etc.—occur with great frequency in experiments with simple hyperventilation and with $O_2$, *but are totally absent in the $CO_2$ experiments.* Every time we have tested a patient who already had a facialis phenomenon with $CO_2$ inhalations, Chvostek's sign has decreased or totally disappeared, whilst with the other methods it has never failed to increase considerably.

It cannot be denied that this finding seems to support the alkalosis theory, originally stated by Grant and Goldmann, in which they explain the hyperventilation tetany by alkalosis alone. Without discussing the question in detail, however, we must point out that of course the $CO_2$ inhalations cause changes in the ion-concentrations different to those caused by simple hyperventilation and by $O_2$ hyperventilation, and it may be these changes which cause the absence of the tetany symptoms. The Ca-ion during hyperventilation has been examined by several investigators, but the results have often been antagonistic. We will only add that, in agreement with Hendriksen, we have not been able to prove any parallelism between the appearance and intensity of the tetany phenomena on one hand, and the appearance of the epileptic phenomena on the other.

## DISCUSSION.

When we turn to the chief problem—what the factor is which is changed during the $CO_2$ inhalations, and which causes the non-appearance of the fits—we must admit that our experiments only give very little direct information about this—their arrangement and results are meant merely to orientate and are only presented as a preliminary report.

Without a more refined technique, without extensive use of chemical investigations of the composition of the blood during the different experimental

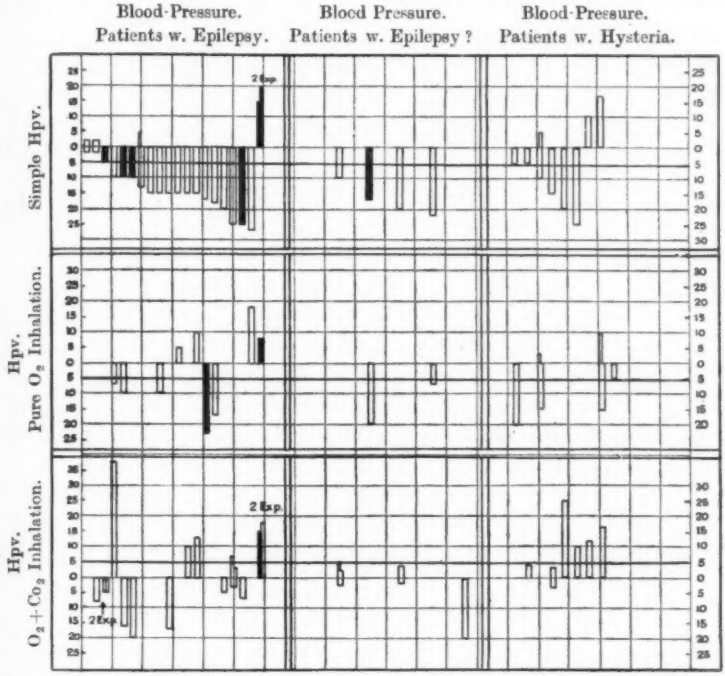


FIG. 2. The blood-pressure during the experiments. The columns indicate the rise or fall of blood pressure. Black marks patients with fits during the experiment. The columns for each patient are placed in the same vertical line.

conditions, and especially without a large control-material of experiments on normal persons, these experiments will hardly lead to a definite answer to this important question. But it is possible, on the basis of the investigations in hand concerning the general reaction of the organism towards forced respiration, and to inhalation of $CO_2$ and $O_2$, to point out some of the explanations which may possibly correspond to our experiments.

Here we will partly discuss circulation, especially the blood-pressure, partly changes in the composition of the blood.

I. As is seen in fig. 2, in which we have set down the blood-pressure of one group of patients, divided according to the methods of hyperventilation used, we have on simple hyperventilation in by far the greater number of cases found a decrease in blood-pressure, i.e., in 27 out of 33 cases. The decrease in blood-pressure on simple hyperventilation is caused by a series of factors.

Because of the $CO_2$ ventilation the tonus of the vasomotor centre towards the vessels is decreased (Dale and Evans), it being the general opinion that $CO_2$ has a specific influence on this centre, as it has it on the centre of respiration (Henriques and Ege). At the same time the decreased tension of $CO_2$ in the peripheral vessels causes a certain degree of anoxæmia—according to the 'Bohr effect' (cf. Haldane), and from this follows a failure of the peripheral circulation, which has been shown by Henderson by direct observation of the intestinal vessels, and by Stewart in the vessels of the hand by a calorimetric method. This causes a smaller reflux to the heart through the veins, and hence a decrease in the minute-volume. Moreover it is likely that mechanical factors are of importance, at any rate so far as the initial fall in blood-pressure during hyperventilation is concerned. As mentioned, a fall in blood-pressure was found in most of our experiments.

While, however, we are not able to accept the hypothesis of Hendriksen, that the fall in blood-pressure is the direct cause of the epileptic fit during hyperventilation, because it causes a reactive constriction of the vessels of the brain, this is firstly due to the fact that neither in our own nor in Hendriksen's experiments do we find any parallelism between the intensity of the fall and the occurrence of the fits ; secondly, because we have seen fits appear simultaneously with a rise in blood-pressure—we must admit this was only seen in one patient but on repeated experiments—and thirdly, because, in spite of the repeated occurrence of fall in blood-pressure in experiments with $O_2$, we have not seen any fits accompanying this fall. In three patients hyperventilation is accompanied by a rise in blood-pressure—all these patients also show a rise in blood-pressure during $O_2$ and $CO_2$ experiments—in one case it was, however, followed by a fall in pressure. Perhaps the divergent reaction of these patients is due to physical factors or to great muscular effort—according to Raab both these factors are able to complicate the effect of $CO_2$ ventilation. In the experiments with $CO_2$ we more often find a rise in blood-pressure, as might be expected, seeing that the same factors are acting as in simple hyperventilation, but in the opposite way.

The fact that in several cases we find a fall in blood-pressure differs from the results of the experiments of several investigators on normal subjects, e.g., Raab, and thus it *might* be a reaction characteristic of epilepsy, but we have no control experiments on normal persons and are not able to express any opinion on this question.

It seems to us to be interesting that without exception the $CO_2$ experiments on patients with hysteria are accompanied by a rise in blood-pressure. This

might be correlated with a greater sensibility of the vasomotor centre towards $CO_2$, or perhaps with the decreased alkali reserve of 'nervous' people and patients with neurasthenia, found by Laignel-Lavastine and by Cornelius and Vincent (cited by Guttmann). If the alkali reserve is decreased, a certain percentage of $CO_2$ in the air inhaled will set free a larger amount of $CO_2$ in the blood, and thus a stronger effect upon the central nervous system will be caused. If an epileptic makes a simple hyperventilation, during which his alkali reserve will be diminished, and he is then given $CO_2$, a rise in blood-pressure will *always* take place; whereas, as we have shown, in several epileptics, who have not first made a simple hyperventilation, there is a fall in blood-pressure.

II. If we now analyse the changes in the composition of the blood, which are the consequence of the hyperventilation, we shall only mention the most important points—those which are of special interest to our series of investigations.

The hyperventilation is accompanied by a ventilation of $CO_2$, and this causes an alkalosis, a non-compensated or partly compensated $CO_2$ deficit (van Slyke). At the same time a decrease of the alkali reserve gradually arises (Henderson and Haggard), which is caused, amongst other factors, by the secretion of a more alkaline urine. According to the equation of Henderson and Hasselbach $\left(C_H = k_1 \frac{C_{H_2CO_3}}{C_{HH\,CO_3}}\right)$ the decrease in the amount of alkali reserve at any rate means a partial compensation of the $CO_2$ ventilation; the $C_H+$ of the blood is displaced less in an alkaline direction than would be the case if the alkali reserve were constant. It is this alkalosis which forms the basis of the theory of the genesis of the fit provoked by hyperventilation, which is accepted by most investigators. Besides this, there is, however, a decrease in the amount of free $O_2$ in the peripheral vessels, and thus also in the tissues, due to the fact that oxygen is more firmly bound to hæmoglobin when $CO_2$ is inhaled—the so-called 'Bohr effect.'

On $CO_2$ inhalation, the same factors are acting, but in the opposite direction; an excess of $CO_2$ arises, i.e., an acidosis, which is partly compensated by the organism through an increase of the alkali reserve. On account of the increased amount of $CO_2$ in the vessels, more oxygen is freed from the hæmoglobin; at the same time the peripheral circulation is easier, and the tension of oxygen in the tissues is thus increased.

Different experimental investigations on animals (e.g. those of Wolff and Lennox) have shown that during hyperventilation there is a constriction of the vessels in the pia, during $CO_2$ inhalation a dilation of these vessels. These changes in the lumina of the vessels will have an effect, as far as the oxygen tension of the tissues is concerned, parallel to the changes in the composition of the blood mentioned.

$O_2$ inhalation produces conditions which mostly resemble those caused by simple hyperventilation, but the amount of oxygen physically absorbed in the

blood-plasma is larger and the $CO_2$ tension in the alveoli also and therefore in the blood as well—the resistance against respiration being greater through a mask, though it is not very much. This seems to agree with the fact that the results of the $O_2$ experiments mostly resemble those of simple hyperventilation, but the epileptic phenomena occur more seldom and are less pronounced. It is thus seen that on simple hyperventilation there is a decrease, on $CO_2$ hyperventilation an increase, of the oxygen tension of the tissues.

The importance of anoxæmia as the cause of the epileptic convulsions has often been discussed. Recently Foerster has attributed to it some importance. Through a pronounced anoxæmia it is possible in normal subjects to provoke convulsions which strongly resemble those of epileptics. It seems natural to us to reckon with the possibility that the occurrence of anoxæmia on simple hyperventilation, and its absence on $CO_2$ hyperventilation, may possibly play a part towards respectively causing or preventing the appearance of fits in these experiments. It must then be supposed that the brain of epileptics is more sensitive to lack of oxygen than that of normal individuals ; in other words, their ' Krampfbereitschaft ' might partly be due to this fact. As, however, a series of other changes take place—in the ion-contents, in stability of the colloids and through this in the permeability of the cells, etc., changes which we have not examined during our different experimental conditions—what we have said about anoxæmia can only be looked upon as one possibility out of many.

Lastly we will briefly discuss the single case in which $CO_2$-$O_2$ hyperventilation caused a fit. It was that of a patient in whom a pronounced ' Krampfbereitschaft ' must be supposed to be present, as in four out of five different experiments carried out on him he exhibited epileptic phenomena. During inhalation of 5 per cent. $CO_2$-$O_2$ mixture he had an ' absence ' by the third minute, at a time when he had quite emptied the accumulation bag, and we had not yet time to regulate the delivery. This result seems to argue against what we have said above about the importance of anoxæmia. But Jacobi has shown, in a series of fine microscopical examinations of the vessels of the pia during simple and $CO_2$ hyperventilation in dogs, that, while simple hyperventilation generally caused a constriction, and $CO_2$ hyperventilation a dilatation of the vessels, at the beginning of the $CO_2$ inhalation (especially when this gas is present in low concentration) a passing constriction of the vessels may occur, and at the same time there is a lower threshold for the electric release of a fit of convulsions. It seems natural to us to suppose that this is what has happened to our patient ; in spite of a beginning acidosis he has had a passing constriction of his vessels and following this a decrease in the oxydisation of the tissues. On testing him with 10 per cent. $CO_2$ no epileptic phenomena were provoked.

If this explanation of the only divergence from the rest of the results is correct, it pleads more in favour of than against the importance of anoxæmia in the epileptic hyperventilation fit.

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# THE DISSOCIATION OF VOLUNTARY AND EMOTIONAL MOVEMENTS OF THE FACE WITH SPECIAL REFERENCE TO EMOTIONAL PARESIS AS A PHYSICAL SIGN.

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## I. INTRODUCTION.

Occasionally reports have appeared in the literature of cases in which there was paresis of the lower part of one side of the face for emotional movements without any corresponding disturbance of facial movements when carrying out definite tests at command such as showing the teeth or whistling. This type of facial paresis has been referred to briefly as emotional paralysis of the face or mimic facial paralysis. In addition it has been a common observation that a smile which is free and equal on the two sides of the face is possible with the facial paralysis associated with hemiplegia. It was thought that the persistence of emotional movements on the two sides of the face was due to bilateral innervation of the face for emotional movements, but the persistence and even the exaggeration of emotional movements of the face in cases of double hemiplegia made it evident that only the presence of a separate path for emotional movements would explain this dissociation of facial movements. Subsequently, a certain amount of evidence, both clinical and experimental, accumulated in support of a separate path for emotional movements of the face and rather less in support of the actual extent and position of that path.

In view of the possible value of emotional paresis of one side of the face in the localisation of lesions of the central nervous system it is necessary to examine the practical difficulties connected with the identification of emotional paresis of the face as a physical sign and to consider, in the light of the information so obtained and the work already done on the presence and position of a separate path for emotional movements of the face, the conditions responsible for the dissociation of voluntary and emotional movements of the face.

Approximately 5,000 cases have been examined and the condition of the voluntary and emotional movements of the face noted in each. The findings so obtained have been correlated with the rest of the physical examination in those in which dissociation of the voluntary and emotional movements of the face was found, and with operation and post-mortem findings when they

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were available. The voluntary movements of all parts of the face were examined but special attention was paid to the lower part of the face, while in addition the play of the features in conversation and the movements of the face when smiling were noted.

In the following pages the types of dissociation of voluntary and emotional movements of the face under different conditions are mentioned and illustrative cases briefly described. The literature is referred to and the conclusions in reference to the clinical application of the physical sign then discussed.

## II. CLINICAL OBSERVATIONS.

In this chapter illustrative cases in which definite dissociation of voluntary and emotional movements of the face has been observed are summarised and discussed, but no distinction is made between cases in which voluntary movements alone were affected and those in which emotional movements alone were affected. In addition a series of cases with lesions of the facial nerve is considered.

### 1.—Cases in which no adequate cause can be found.

Occasionally a case is seen in which, in the absence of local conditions or of lesions of the peripheral or central mechanism of the face, the lower part of the face is found to move asymmetrically for either voluntary or emotional movements. The absence of any condition which might cause the disturbance of facial movements and the observation of many individuals who use one side of the face more than the other in speaking and in smiling suggest that in these the dissociation of voluntary and emotional movements is the result of habit. In some the former alone is affected and in others only the latter. Dissociation of the two types of facial movement has been observed personally particularly in patients suffering from neuroses. The following cases illustrate this group.

Case 1. The patient, female, aged 35 years, had suffered from an anxiety neurosis for five years. The face was symmetrical at rest. On voluntary movement the two sides of the face moved equally, but in speaking and smiling the lower part of the left side of the face moved before and much more freely than the right side. There were no other physical signs.

Case 2. A woman, aged 34 years, complained of nothing abnormal. Apart from the following observations physical examination was negative. For voluntary movements the two sides of the face moved equally. When talking and smiling the lower part of the right side of the face moved first and much more freely than the corresponding part of the left side of the face. The play of the features associated with speaking was confined to the right side of the face.

Case 3. A patient, aged 18 years, complained of sudden jerks and jumps of the arms and legs for about half an hour after rising in the morning. She had had one major epileptic fit two years before, and had a sister who suffered from epilepsy. Apart from the following physical examination was negative. The face was symmetrical at rest, and the two sides moved equally and simultaneously for voluntary movements. When talking and smiling, however, the lower part of the right side of the face took up before and moved much more freely than the left side.

CASE 4. A patient, aged 30 years, was said to have had attacks at night for eight years. During the attacks, which occurred every two months, she struggled, bit her tongue and passed urine. In smiling the lower part of the right side of the face moved before and much more freely than the left side. With voluntary movements there may have been some delay of the lower part of the left side of the face but it was much less obvious than the definite delay which occurred with emotional movements.

These cases will serve to illustrate the observation that impairment of the movement of the lower part of one side of the face is not an uncommon finding in patients who present themselves for examination, and may be confined to emotional movements, be much more obvious with emotional movements than with voluntary movements, or be apparent chiefly with voluntary movements. Slight asymmetry of the two sides of the face on voluntary movement is very common and need not be illustrated here.

### 2.—Peripheral conditions of the face and jaw.

In the presence of local conditions affecting the face, jaw or accessory nasal sinuses, and especially the maxillary antra, dissociation of the voluntary and emotional movements of the face may be observed. The following cases may be regarded as examples of this finding under such conditions.

CASE 5. A man, aged 51 years, had suffered from migraine since he was a boy and from occasional epileptic attacks since the age of 44 years. A visual sensation as of a revolving wheel in the right half of the visual field preceded the attacks and sometimes occurred independently of them. At the age of 47 years the patient suffered from a fracture of the right mandible. On examination, the right angle of the mouth appeared to droop a little below the left angle at rest. When speaking and on showing the teeth at command the right side of the lower part of the face moved less freely than the left side, but on smiling no asymmetry could be detected. Otherwise, physical examination was negative.

CASE 6. A woman, aged 30 years, suffered from pain in the left upper jaw following an attack of coryza. Five days before she was seen a tooth was removed from the left upper jaw. The face was symmetrical at rest. On showing the teeth the right lower face sagged and moved later and less freely than the left side, but on emotional movement the right lower face took up first and moved more freely than the left side. There was tenderness over the left upper jaw.

CASE 7. A woman, aged 47 years, had suffered from twitching of the right side of the face for eighteen months. On examination, an occasional spasmodic twitch of the orbicularis oculi and of the right angle of the mouth was observed. Voluntary movements of the lower part of the right side of the face were definitely impaired compared with the left side, but emotional movements were free and equal on the two sides of the face.

In Case 5 there was impaired movement of one side of the face in its lower part only on voluntary movement, whereas in Case 6 impaired voluntary movement of one side of the face was associated with excessive emotional movement of the same side of the face and relative impairment of emotional movements of the other side. In Case 7, one of facial spasm, the asymmetry of movement in the lower part of the face was associated with voluntary effort only.

### 3.—Lesions of the infranuclear portion of the facial nerve.

It might be expected that with severe lesions of the infranuclear portion of the facial nerve voluntary and emotional movements would be affected equally and completely, but it is doubtful whether dissociation of voluntary and emotional movements of the face might not occur with mild or transient lesions of the facial nerve or during recovery from facial paralysis. The examination of a large series of cases of severe facial paralysis has confirmed the expectation that no dissociation of the two types of facial movement would occur under such conditions. In the following case the lesion of the facial nerve was particularly severe.

Case 8. The patient, female, aged 26 years, had suffered from paralysis of the right side of the face since birth as the result of an instrumental delivery. There was complete paralysis of the right side of the face affecting both the upper and the lower parts. Voluntary and emotional movements were affected equally and completely.

In the type of facial paralysis which results from pressure of obstetric forceps it is generally accepted that the nerve is injured after its exit from the skull. The lesion is probably in or about the same region in cases of Bell's paralysis of which the following case is an example.

Case 9. The patient, female, aged 19 years, awoke one morning with the left side of the face completely helpless. For seven days before she had had pain below the left ear. When examined twenty-four hours after the onset of the facial condition there was complete paralysis of the left side of the face affecting both the upper and lower parts and involving both voluntary and emotional movements equally and completely.

A similar complete involvement of the facial nerve occurs when the nerve is injured as it passes through the petrous portion of the temporal bone or in its course over the base of the skull.

Case 10. The patient, female, aged 71 years, had a mastoid operation six weeks before she attended for examination. The left side of the face was helpless when she recovered from the anæsthetic. There was complete paralysis of the right side of the face involving both voluntary and emotional movements equally.

Nevertheless, in some cases in which the facial paralysis of a peripheral type is not severe, there is some degree of dissociation between the voluntary and emotional movements of the affected side of the face. The following is an example.

Case 11. The patient, female, aged 54 years, suffered from severe pains in the back of the neck for three days and awoke on the morning of the fourth day with the left side of the face helpless. When examined seven days later there was paralysis of the left side of the face with inability to close the left eye completely. With voluntary movements the left angle of the mouth merely lagged slightly behind the right angle, but on smiling movements were quite free on the right side of the face and absent on the left side.

The disturbance of facial movements associated with contracture of the facial muscles on one side has probably been illustrated satisfactorily by Case 7 quoted above, but the following cases are added to illustrate the effect of an old facial paralysis which had almost recovered.

CASE 12. The patient, female, aged 42 years, had suffered from twitching of the left side of the face for four years. Seven years before she had paralysis of the left side of the face for three months. On showing the teeth at command the lower part of the left side of the face moved less freely than the right side, whereas in smiling the two sides of the face moved simultaneously and equally.

CASE 13. A man, aged 28 years, had suffered from paralysis of the right side of the face in childhood. During the past three years he had had eight epileptic fits. There was delay of the lower part of the right side of the face much more obvious for emotional movements than for voluntary movements.

As a general rule it is found that the voluntary movements are affected more than the emotional movements in old-standing cases of facial paralysis which have apparently recovered, but occasionally the emotional movements are affected to a much greater extent than the voluntary movements. In other cases voluntary movements are impaired at the angle of the mouth on the same side as the old facial paralysis and at the same time the emotional movements on that side appear to be exaggerated.

It would appear therefore that with severe lesions of the infranuclear portion of the facial nerve both voluntary and emotional movements of the affected side of the face are affected equally and completely, whereas with mild lesions in which the facial movements are only moderately affected, during recovery and with post-paralytic facial spasm the voluntary and emotional movements may be involved to different degrees.

#### 4.—Lesions affecting the extrapyramidal motor system.

The common conditions in which the extrapyramidal motor system is involved are postencephalitic Parkinsonism and paralysis agitans. Both are characterised by muscular rigidity of a type usually described as the extrapyramidal type, in the former the rigidity usually being the most prominent feature, while in the latter the tremor is as a rule more prominent than the rigidity. In the former particularly the rigidity may affect the face as well as the limbs and trunk, and just as the limbs of one side may be affected alone or predominantly so may one side of the face be affected more than the other. Since Monrad-Krohn[1] has based certain deductions as to the dissociation of voluntary and emotional movements of the face upon these cases it is necessary to refer to them briefly. The following cases illustrate the more important points in connection with the subject under discussion.

CASE 14. The patient, female, aged 24 years, complained of trembling and of slowness of movement of the right arm and leg. She had a definite attack of encephalitis five years before. On examination, a stare, retraction of the upper eyelids, blepharoclonus, a fixed expression, movement *en masse* in a somewhat flexed attitude, and proximal rigidity of the right arm and leg were evident. On showing the teeth at command the face moved slowly, the left side moving much more freely than the right side, whereas in smiling the two sides of the face moved equally.

CASE 15. The patient, female, aged 25 years, had suffered from trembling of the limbs and oculogyric crises for five years. In walking she took a rapid step with the right foot and then dragged the left foot after it. The left side of the face moved much less freely than

the right side for both voluntary and emotional movements, the difference being much more obvious with the former than with the latter. There were, in addition, tremor of the head and tongue, blepharoclonus, oculogyric crises upwards and proximal rigidity of the left arm and leg.

In these two cases rigidity chiefly unilateral in distribution and of the extrapyramidal type was associated in the first case with impairment of voluntary movement of the face on the affected side, and in the second case with impairment of voluntary movement more than of emotional movement on the affected side. In the following case, however, voluntary movement only was impaired on the same side as the rigidity of the limbs, whereas emotional movements were so active on that side that there appeared to be emotional paresis of the lower part of the opposite side of the face.

CASE 16. The patient, male, aged 52 years, had an attack of encephalitis two years before and had suffered from shaking of the left hand and stiffness of the left arm and leg for eighteen months. On examination, a stare, blepharoclonus, fixed expression, tremor of the left hand, proximal rigidity of the left arm and leg, and bradykinesia were evident. For voluntary movements the left side of the face moved much more slowly than the right side, while for emotional movements the lower part of the left side of the face moved much more freely than the corresponding part of the right side of the face.

In Monrad-Krohn's fifth case, delay of emotional movements only of the left side of the face, proximal rigidity of the left arm and leg and a doubtful extensor plantar reflex on the left side were present together. A similar association of an extrapyramidal type of rigidity with evidence of involvement of motor paths and dissociation of voluntary and emotional movements of one side of the face was observed in the following case—one of mesencephalitis syphilitica.

CASE 17. The patient, female, aged 40 years, had gradually lost the use of the left arm and leg during the previous eleven months. She had been married seven years and had never been pregnant. On examination the following positive findings were elicited—stare, ptosis, relative inactivity of the left pupil to light compared with the right, fixed expression, rigidity of the limbs proximally more on the right side than on the left, grotesque movements of the right leg and extensor plantar reflexes on both sides. For voluntary movements the right side of the face moved behind and much less freely than the left, while for emotional expression both sides of the face moved freely and equally.

In this case the pyramidal lesions were apparently factors common to the two sides. In the following case some degree of dissociation of facial movements with paralysis agitans is illustrated.

CASE 18. A woman, aged 67 years, had suffered from trembling of the hands and face for twelve months. She noticed this first in the right thumb. On examination the following findings were noted—congenital nystagmus, a fixed expression, movement *en masse*, tremor of the lips and tongue, a pill-rolling tremor chiefly in the right hand, and rigidity of all the limbs proximally but more so on the right side. The right side of the face moved less freely than the left side for voluntary movements and also for emotional movements, but with the latter the asymmetry of the face was less obvious.

In addition, it is a well-known observation for which no definite illustration is necessary here that in cases affected with extrapyramidal rigidity more or

less equally on the two sides voluntary movements of the face may begin and develop slowly, whereas with emotional expression the face may move rapidly and much more freely.

**5.—Conditions associated with disturbance of cerebellar function.**

In the group of cases illustrated above the factor common to them all may be regarded as release of a postural reflex arc with the production of rigidity of the limbs, trunk and face of an extrapyramidal type. In the cases to be described below the essential feature may be regarded as diminution of muscle tone as a result of interference with cerebellar function by disease of the cerebellum or of afferent or efferent cerebellar paths. The relationship between cerebellar dysfunction and the disturbance of facial movements was suggested by Weisenburg[2] in commenting upon the symptoms of cerebellar lesions as shown by cinema studies. He reported that with cerebellar lesions emotional expression was not as a rule affected, though the face appeared to have less expression and it was difficult for the patient to laugh.

With tumours of one lateral lobe of the cerebellum it is occasionally recorded that voluntary movements on the same side of the face are impaired, and in others that both voluntary and emotional movements are affected. The latter may be involved more severely than the former.

With the heredo-familial ataxias the changes are often bilateral and consequently attention is not drawn to variations in the facial movements. Rarely a case is seen in which the changes are more obvious on one side.

Case 19. D. H., female, was admitted under the care of Dr. Walshe with a history of 16 months duration. On examination the patient was dysarthric and showed pallor of the temporal halves of the optic discs and slight nystagmus on lateral deviation of the eyeballs to the left. At rest there was an apparent smoothing of the right lower face and in talking the left side of the face moved more than the right side. On voluntary movements of the face at command and with free emotional movements this difference was, however, partly obliterated. In addition there were found—diminished power, incoordination and dysdiadokokinesia more obvious in the right arm than in the left; weakness and increase of tone in both lower limbs; some impairment of vibration sensibility in the malleoli; and bilateral extensor plantar reflexes. The patient's mother was similarly affected.

The most characteristic changes associated with hypotonia of this type have been observed in cases of Sydenham's chorea. In some cases in which the distribution of the hypotonia was bilateral no definite dissociation was observed, while occasionally in cases in which the hypotonia was confined to the limbs of one side no difference between the voluntary and emotional movements of the two sides of the face could be detected. Nevertheless, in the majority of cases in which the condition was confined to the limbs of one side some variation in the movements of the face on the same side was evident. The following are illustrative cases.

Case 20. The patient, female, aged 17 years, complained of movements of the right arm of one week's duration. She had had a previous attack for five weeks two and a half years before. There were choreic movements of the right arm and diminution of motor power,

muscle tone and tendon reflexes chiefly in the right arm and leg. On voluntary movement the lower part of the right side of the face moved later and to a less extent than the left side, while on emotional movement this difference was much less obvious.

CASE 21. The patient, female, aged 10 years, had had irregular movements of the limbs for some weeks. There was a slight internal strabismus of the left eye, congenital in origin. The left arm and leg showed choreic movements, decrease in motor power and muscle tone, and diminution of the tendon reflexes. There was some delay of the lower part of the right side of the face for voluntary movements but none for emotional movements.

In all the cases of this type examined the same general features were observed: delay of the lower part of the ipsilateral side of the face for voluntary movements only when the hypotonia was slight, and delay more obvious for voluntary than for emotional movements when the hypotonia was more severe.

In addition, attention must be drawn to the fact that in Weisenburg's[3] case of emotional facial paralysis the superior cerebellar artery on the same side was thrombosed. The writer believed the emotional paralysis to be the result of interruption of a cerebellar path. A similar case has been described recently by Russel[31].

**6.—Conditions associated with definite lesions of one or both pyramidal tracts.**

It has been long recognised that in cases of facial paresis associated with hemiplegia the smile may be equal on the two sides of the face even though the voluntary movements are lost on one side. This dissociation of voluntary and emotional movements of the affected side of the face appears to occur whenever the pyramidal tract is definitely affected at any level between the motor cortex and the facial nucleus, and to be independent of the nature of the lesion which causes the hemiplegia or diplegia. The same dissociation of voluntary and emotional movements is apparent in both severe and slight cases of hemiplegia and during transient attacks of hemiparesis; while exaggeration of emotional movements may occur when both pyramidal tract are involved.

In the following case, however, emotional movements only were affected.

CASE 22. The patient, female, aged 43 years, found the right arm and leg suddenly become dead and useless. The condition lasted for about three hours and then recovered. Since then there had been twitching of the left shoulder and eyelids, while for twelve months there had been pins and needles from the fingers of the right hand up the arm. When examined two days after the onset of the condition, there was weakness of the lower part of the right side of the face for emotional movements but not for voluntary movements. The only other positive finding was arteriosclerosis of the retinal arteries.

It is evident that in those cases in which voluntary movements are affected while emotional movements are unaffected or excessive the lesion must damage a path controlling voluntary movements and leave that controlling emotional movements intact or even release it from some restraint. In Case 22 paralysis of emotional movements only occurred, but it is possible that the case might be grouped more correctly in the next series.

### 7.—Conditions affecting the cerebral cortex and the adjacent parts.

With lesions involving one cerebral hemisphere and directly affecting the prerolandic motor cortex it is found that with hemiplegia or hemiparesis the face on the same side is weak for voluntary movements only or for voluntary movements to a much greater extent than for emotional movements. With tumours confined to the motor cortex and the subjacent parts the firstnamed finding is the more common, whereas involvement of adjacent parts of the cerebral cortex is often associated with some degree of emotional paresis as well. With tumours involving other parts of the cerebral cortex the findings may vary considerably from those noted with tumours confined to the parietal region.

In a previous paper on tumours confined to the occipital lobe[4] it was noted that, while in the majority of cases in which hemiparesis was present the facial paresis associated with it was more apparent on voluntary movement, there were many cases in which either voluntary and emotional movements of the lower part of one side of the face were equally affected, or emotional movements were impaired alone or to a greater extent than voluntary movements.

In view of Spiller's[5] suggestion that impairment of the sense of position in the face might be a factor of some importance in the occurrence of emotional paresis of the face, the cases of occipital tumour were analysed to find if there was any definite relationship between impairment or loss of the sense of position in the contralateral limbs and impairment of emotional movements of the corresponding side of the face. It was found that in cases in which emotional movements were impaired either alone or to a lesser extent than voluntary movements the sense of position was unaffected and that when the sense of position was impaired the emotional movements were not necessarily affected. There were, however, cases in which emotional paresis of the contralateral side of the face was associated with loss of the sense of position in the limbs on the same side.

Case 23. The patient, female, aged 50 years, was admitted under the care of Dr. Adie complaining of headaches, pain in the right side of the face, twitching of the left arm and foot, vomiting, drowsiness, and failing memory of twelve months' duration. On examination, vision was impaired and in addition there were found complete left homonymous hemianopia, slight papilloedema, nystagmoid jerks on lateral deviation of the eyes, and weakness and hypotonia of the left arm and leg. The sense of passive movement was absent or seriously impaired in the fingers of the left hand and the toes of the left foot. There was weakness of the left side of the face in the region of the mouth for emotional movements only. A tumour was removed from the right occipital lobe.

In this case there was no evidence of involvement of the pyramidal tracts and it was probable that the delay of the left side of the face on emotional movements was directly associated with the hypotonia and impairment of the sense of position in the limbs of the same side. In the following case similar findings were recorded.

CASE 24. The patient, male, aged 25 years, complained of dimness of vision and jerkings of the right lower limb of three years' duration, and of weakness of the right hand and arm and of difficulty in remembering names of six months' duration. On examination there were found impairment of visual acuity, right homonymous hemianopia, alexia, impairment of superficial sensation over the limbs and trunk on the right side, and some weakness of the right arm and leg. The sense of passive movement was impaired in the right arm and leg, and there was weakness of the right side of the face near the mouth on emotional movements only.

It would appear then that impairment of the sense of position may be related to the diminution or loss of emotional movements of the same side of the face. Nevertheless, the occurrence of unilateral emotional paresis of the face with tumours in the same region and without deep sensory changes suggests that impairment of the sense of position cannot be the only factor.

A review of cases of tumour involving the temporal and the frontal lobes reveals a number of cases in which emotional movements of the lower part of the opposite side of the face are impaired either alone or more than voluntary movements. This observation is not, however, the most usual one with tumours in these regions, as it is more common for voluntary movements to be affected alone or more than emotional movements. The following cases illustrate impairment of emotional movements of the opposite side of the face with tumours of the frontal lobe.

CASE 25. The patient, female, aged 42 years, showed much more obvious expressional movements on the right side of the face than on the left side, while no asymmetry of the face could be detected when showing the teeth at command. At autopsy there was found a glioma involving the centre of the right frontal lobe, extending across the genu of the corpus callosum to involve the opposite hemisphere, and backward to involve the head of the caudate nucleus and the upper and anterior part of the lenticular nucleus.

CASE 26. The patient, male, aged 57 years, had a flaccid hemiparesis involving the right arm and leg. The eyelids on the right side were not approximated so strongly as on the left side, and the right angle of the mouth drooped. In smiling and attempting to talk the left half of the face took up first and moved much more freely than the right side. At autopsy a tumour was found in the right frontal lobe with a hæmorrhagic cyst extending down to the anterior horn of the lateral ventricle.

A similar finding is not uncommon with tumours involving the temporal lobe. The following are illustrative cases.

CASE 27. The patient, male, aged 56 years, had a left hemiplegia. The left palpebral fissure was larger than the right, and the left angle of the mouth drooped more than the right. For emotional movements the right side of the face moved much more freely than the left side, while for voluntary movements very little asymmetry was noted. At autopsy a softened hæmorrhagic tumour was found coming to the surface on the inferior surface of the right temporal lobe. It infiltrated widely the substance of the temporal lobe.

CASE 28. The patient, male, aged 58 years, had slight left facial weakness for voluntary movements. For emotional movements the left side of the face took up later than the right side and moved much less freely. The asymmetry was more obvious with emotional movements than with voluntary movements. At operation a glioma was shelled out of the middle portion of the right temporal lobe.

Reference to case records shows that this particular type of dissociation is much more common with tumours involving the frontal and temporal lobes. In connection with this point it is worth noting that Friedmann and Elsberg[6] have observed a number of cases of tumour of the temporal lobe with facial paralysis of the supranuclear type which was severe and seemed to be peripheral in type. In these cases there was no question of distal pressure on the facial nerve and the electrical reactions were normal. Friedmann continued: "It is my impression that in these cases we are dealing with a combination of voluntary and mimetic facial palsy, the latter being due to distant pressure on the optic thalamus. We then observe a complete facial paralysis which resembles a peripheral palsy but is not of this type. I have seen this symptom frequently enough to make it an interesting clinical observation."

Emotional paresis of the face has also been observed in a case of disseminated sclerosis, though in this condition the position of the responsible lesion was not known.

CASE 29. The patient, female, aged 41 years, complained of pains and numbness in the thighs of two weeks' duration. The right leg had been weak for eighteen months and the left leg for two and a half years. Six years before the right side of the face had been numb for some months; five years before the right leg had been weak and recovered; three and a half years before there had been diplopia for ten days; and two years before there had been occasional incontinence of urine. On examination there were found temporal pallor of the optic discs, lateral nystagmus, weakness of the left lower limb, bilateral extensor plantar reflexes and absent abdominal reflexes. In speaking the right angle of the mouth drooped below the left, and the right lower face took up later and moved less freely than the left. The same effect was apparent on smiling. With voluntary movements the two sides of the face moved freely and equally.

## IV. THE DISSOCIATION OF VOLUNTARY AND EMOTIONAL MOVEMENTS OF THE FACE.

The recognition of the dissociation of voluntary and emotional movements of the face has depended upon two groups of observations, at first distinct from one another but later considered together in the attempt to explain the dissociation and also the emotional paresis occurring independently of paralysis of voluntary movements. As pointed out by Kinnier Wilson, in 1837 Stromeyer[7] described a case in which there was emotional paresis of one side of the face without impairment of voluntary movements, and in 1844 Bell[8] drew attention to the dissociation of voluntary and emotional movements of the face, pointing out that paralysis of emotional movements could occur without paralysis of voluntary movements. Cases of this type have been described by Nothnagel[9], Nonne[10], Monrad-Krohn and many others. On the other hand Gowers[11] showed that in the facial paresis associated with hemiplegia the smile might be equal on the two sides though voluntary movements were lost on one side of the face. Apart from reports of individual cases subsequent publications have been concerned with attempts to explain these findings in anatomical and physiological terms. Since these papers have been reviewed within recent years by Kinnier Wilson[12] and by Feiling[13] there is no need to refer to them further here.

It is necessary, however, to refer to the different views which have been expressed to explain the dissociation of voluntary and emotional movements of the face. These may be summarised briefly as follows.

1. *The peripheral theory.*—It was suggested by Bell that differences in function might result from different degrees of involvement of the facial nerve. It would appear, however, that if the trunk of the facial nerve were involved it would be affected for all types of activity. This is certainly true when the lesion of the facial nerve is a severe one, but there appear to be cases in which voluntary movements are affected chiefly (Monrad-Krohn and Case 12) and others in which emotional movements are affected chiefly or alone (Spiller[14] and Cases 11 and 13). In these cases the dissociation is usually slight, though in Case 11 it was extreme, and the lesion of the facial nerve is either a slight one or apparently recovering.

2. *The hypothesis of physiological couples.*—This hypothesis was propounded by Broadbent[15] to explain the dissociation of voluntary and emotional movements of the face associated with hemiplegia. The muscles of the two sides of the face were regarded as acting as physiological couples for involuntary movements, these movements therefore remaining unaffected in the presence of a hemiplegia. It was impossible, however, to use this hypothesis to explain unilateral impairment of emotional movements of the face.

3. *Separate paths for voluntary and emotional movements.*—While the above hypothesis could not be used to explain paralysis of emotional movements alone, the occurrence of normal and even exaggerated emotional movements of the face in cases of double hemiplegia rendered it equally inapplicable to paralysis of voluntary movements in the presence of normal emotional movements with hemiplegia. Hence there arose the hypothesis of separate paths for voluntary and emotional movements. Subsequent investigations and hypotheses have been concerned chiefly with the identification of the path or paths for emotional movements.

4. *A thalamic psycho-reflex path.*—To explain the cases of hemiplegia Nothnagel suggested a psycho-reflex path distinct from the facial division of the pyramidal tract and concerned with the optic thalamus and its connections. To explain emotional paresis in the absence of voluntary paresis of the face he postulated a lesion in or near the optic thalamus. According to Kinnier Wilson much of the clinico-pathological evidence in support of the latter hypothesis must be accepted with reserve though the role of the optic thalamus cannot be lightly dismissed. Monrad-Krohn also found it necessary to postulate as the emotional path a reflex path with its centres in the corpus striatum.

5. *Cortico-thalamic control.*—It has been suggested (Brissaud[16], Oppenheim[17]) that the above mechanism was controlled from the cortex by anatomical connections between the cortex and the corpus striatum, and that the excessive emotional expression in cases of pseudobulbar palsy was the result of irritation of the optic thalamus. As an objection to this hypothesis it has been pointed

out that these anatomical connections have not been confirmed by subsequent observers.

6. *The effect of sensory ataxia.*—Sensory ataxia produced by appropriate cortical lesions has been shown experimentally to be associated with an explosive type of voluntary movement (Bickel[18]); and it has been suggested that peripheral sensibility has a much greater influence on emotional expression than on voluntary innervation of the facial muscles. This view has been supported by Hartmann[19], von Monakow, and Lewandowsky[20]. Lesions producing emotional paresis would then be found in the cortex or subcortical systems. In connection with this hypothesis it is necessary to mention Spiller's suggestion that deep pressure sensation in the face is an important factor, this sensation according to Spiller and others being conveyed by the facial nerve and not by the trigeminal nerve.

7. *Separate paths identical with those described by Spencer.*—Kinnier Wilson has suggested that there is a double control over the facio-respiratory movements—voluntary control which inhibits automatic movements, and involuntary control when the facial muscles are forced to give way to the expression of emotion. Voluntary control is secured through the corticopontine, bulbar and spinal motor path. In addition to this path, Spencer[21] described an arresting path from the under surface of the frontal lobe and an accelerating path from the sensory cortex, both independent of the motor path, coming together on the mesial aspect of the optic thalamus and running down near the middle line of the tegmentum to the medulla. Wilson thinks it feasible to regard these paths as those for the emotional activation of the facio-respiratory apparatus. In support of this suggestion are cited the clinico-pathological findings in Stromeyer's case, and Graham Brown's[22] stimulation experiments on a path close to the inner aspect of the red nucleus. Emotional paresis of the face might then be produced by a lesion of this path anywhere between the cortex and the pons.

The evidence available strongly supports the presence of separate paths for voluntary and emotional movements of the face, and the identification of the paths for the latter, at least below the level of the optic thalamus, with those described by Spencer and referred to by Kinnier Wilson. While this hypothesis certainly explains the cases of hemiplegia, pseudobulbar palsy and many of the cases of unilateral emotional paresis of the face, it leaves unexplained some of the cases described in this paper. The occurrence of unilateral amimia in individuals without any evidence of an organic condition might, however, be explained by postulating that the emotional movements of one side of the face are released habitually to a greater or lesser degree than those of the other side. It may be possible to classify this emotional asymmetry of the face as a tic-like effect operating through the accelerating and retarding paths mentioned above. The fact that it has been observed particularly in patients suffering from neuroses and less often in epilepties, in both of whom there is an evident or partially concealed maladaptation to life

and environment, is certainly very suggestive of a release mechanism operating from the higher cortical or psychological level. The relative urgency of emotional movements compared with voluntary movements suggested by Monrda-Krohn seems to provide an adequate explanation of the impairment of voluntary movements to a greater extent than emotional movements in some cases with local conditions of the face and jaw, incomplete lesions of the facial nerve, an extrapyramidal type of muscular rigidity and cerebellar dysfunction. If then this factor comes into operation it is necessary to consider how its effects may be varied by the increased muscle tone of extrapyramidal rigidity, the diminished muscle tone associated with cerebellar dysfunction, or the probable decrease or increase of muscle tone in the facial muscles associated with a mild or recovering lesion of the infranuclear portion of the facial nerve. It is necessary also to consider whether the variations in muscle tone are important in those cases with lesions of the cortex associated in some cases with impairment of voluntary movements alone and in others with impairment of voluntary movements more than of emotional movements. With some cases of peripheral facial paralysis there appears to be a stage during recovery when emotional movements are impaired either alone or more than voluntary movements, an example of which is quoted in a previous chapter. That being so, may not a similar stage occur during the development or recovery of facial paresis associated with cortical lesions and so explain the occurrence of some degree of emotional paresis of the face with lesions so widely separated as those of the frontal lobe and those of the occipital lobe ? If the condition of muscle tone in the muscles of the face is a factor influencing the relative effect of voluntary and emotional innervation of the face, it is probable that impairment of postural sensibility will be a factor in some cases in so far as it varies the condition of the peripheral structures through which the dual control of the facio-respiratory mechanism produces its visible effects. These questions which naturally arise from a study of the dissociation of voluntary and emotional movements of the face in patients presenting themselves for examination do not in any way invalidate the evidence adduced in support of the hypothesis advanced by Kinnier Wilson, but they do suggest that other factors may come into operation and influence the voluntary and emotional movements of the face in such a way as to produce effects which resemble those due to a lesion of the suggested emotional path.

## IV. EMOTIONAL PARESIS OF THE FACE AS A PHYSICAL SIGN.

Since the correlation of clinical, pathological, anatomical and experimental evidence has suggested the identification of the path for emotional expression with that mentioned above, a lesion injuring or destroying this path might be expected to produce emotional paralysis of the face on the opposite side. It is very probable that lesions of the tegmentum between the level of the optic thalamus and that of the upper part of the pons do so, as cases have been described in which this part of the path could have been injured and emotional

paralysis was present on the opposite side of the face. Hence in such cases emotional paralysis of one side of the face may be a physical sign of considerable value. It is necessary, however, before applying a physical sign in clinical work to be sure not only that it can be readily identified but also that other conditions do not produce an effect which may be confused with it.

It has been shown that diminution or paralysis of the emotional movements of one side of the face may occur in individuals in whom there is no known physical lesion, and in others what appears to be emotional paresis with local conditions of the face and jaw. The effect of an apparently recovered facial paralysis of the peripheral type must also be considered, as impairment of emotional movement alone or to a greater extent than of voluntary movement may sometimes occur. The poverty of emotional movement in contrast with free voluntary movement may also introduce a fallacy into the identification of the physical sign in the presence of cerebellar dysfunction. Again, when rigidity of the extrapyramidal type is more obvious on one side of the face, the impression may be produced that emotional movements of one side of the face are impaired. Finally with lesions of or in the neighbourhood of the cerebral cortex emotional movements of the opposite side of the face may be impaired either alone or to a greater extent than voluntary movements with tumours not only of the frontal and temporal lobes but also with those of the occipital lobe.

It appears then that there are many fallacies associated with the identification of emotional paresis of the face as a physical sign and that, in the present state of our knowledge, it is of value in the localisation of a lesion of the contralateral portion of the tegmentum between the optic thalamus and the pons only when these fallacies have been excluded and when associated with other physical signs of a lesion at this level.

## V. SUMMARY AND CONCLUSIONS.

1. The voluntary and emotional movements of the face have been examined in a series of 5,000 patients presenting themselves for examination and the findings correlated with the rest of the physical examination and in some cases with operation and post-mortem findings in those cases in which dissociation of voluntary and emotional movements of the face has been observed.

2. Cases are described to illustrate the occurrence of various types of dissociation of voluntary and emotional movements of the face under different conditions.

3. Reference is made to the various hypotheses propounded to explain the dissociation of voluntary and emotional movements of the face.

4. The presence of separate paths for voluntary and emotional movements is essential to explain the dissociation of the two types of facial movement, but it is probable that other factors influence the condition of the facial musculature and vary the relative extent of voluntary and emotional movements.

5. There are many fallacies associated with the identification of emotional paresis of the face as a physical sign.

The cases upon which this paper is based were examined in the Out-Patient Department of the National Hospital, Queen Square, London. My thanks are due to Dr. Adie and to Dr. Walshe for permission to refer to cases subsequently under their care as in-patients, and to Dr. Greenfield for the opportunity of referring to the pathological findings in individual cases.

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# A STUDY OF PHOBIAS.*

By

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Semeiology is frequently useful in the classification of morbid conditions. The prognosis and treatment of diseases in which phobias occur differ widely and it was thought worth while to determine whether phobias differ with the nosological position of the disorder in which they are found, and if these differences can be utilized in making a diagnosis. Since they occur both in the neuroses and in the psychoses it was considered that perhaps such a study might result in data that would be of aid in doubtful cases in the differentiation of the two. To this end the phobias occurring in 733 cases of psychoneurosis, 672 cases of manic-depressive psychosis, and 544 cases of dementia præcox from the private practice of Dr. Hugh T. Patrick were studied and the result of the study is the subject of this report.

## SOME VIEWS OF CAUSATION AND TREATMENT.

There are, as is well known, different views as to the cause of phobias. According to Dejerine and Gauckler[1] phobias in psychoneurotics occur as a result of the misinterpretation of various unpleasant or distressing sensations or experiences, which these patients so often have. They stated that food phobias, for example, may occur as a result of attaching an erroneous significance to distressing sensations about the stomach, such as a feeling of pressure or heaviness. They also described phobias of heart disease as being caused by the misinterpretation of unpleasant sensations about the heart, such as fullness, tightness, or palpitation, and the phobia of impending insanity as due to attaching a wrong significance to such symptoms as headache, vertigo, disturbances of sleep, and disturbances of equilibrium. To take just one more example from these writers, they stated that from the fear of impending insanity the patient may develop the further fear of losing self-control and while in this state harm himself or perform a criminal deed. According to Dejerine and Gauckler, then, phobias in the psychoneuroses are understandable, logical, systematized; they have an adequate and obvious cause; and this cause is the misinterpretation of a peculiar or distressing physical sensation. Ballet[2] held the same view; among many instances he cited the case of a neurasthenic, suffering from rachialgia, who falsely interpreted this distress as indicating disease of the spinal cord, and developed the consequent phobia of disease of

* From the Department of Nervous and Mental Diseases, Northwestern University School of Medicine. Read at a meeting of the Central Neuropsychiatric Society, September 27, 1930.

that part of the nervous system. Pollock[3] described the occurrence of phobias in psychoneurotics as a result of the misinterpretation of physical sensations. Ross[4] described in neurasthenia the occurrence of fears for which the patient could give excellent reasons, such as that 'his head feels so queer that he must be going mad.' In other words, he placed on these fears the same interpretation as the above-mentioned writers, that such fears arose from the misinterpretation of various sensations. In compulsion neurosis Ross spoke of the occurrence of phobias for which the patient could give no reason.

Other writers, especially psychoanalysts or those psychoanalytically minded, have interpreted the causation of phobias quite differently. For Freud[5] phobias do not have the simple, direct, logical, understandable systematized genesis of which the above writers give an account. He described two types of phobias. One type occurs in compulsion neurosis, and regarding them he wrote as follows: "In a predisposed person if there is no adaptation for conversion and still for the purpose of defence a separation of an unbearable idea from its affect is undertaken, the affect must then remain in the psychic sphere. The weakened idea remains apart from all association in consciousness, but its freed affect attaches itself to other not in themselves unbearable ideas, which on account of this 'false' connection become obsessions. This is in brief the psychological theory of the obsessions and phobias." Freud further stated that the phobias of anxiety neuroses (agoraphobia and its accessory forms) do not originate from repressed ideas, and that on psychological analysis they prove themselves not further reducible.

In the same way in which authors differ in their views as to the cause of phobias they also differ as to the method of the eradication of the latter. Thus Ballet[2] wrote: "The neurasthenic hypochondriac is amenable to reason; he readily lets himself be convinced by arguments when they are well put before him, and if it is sometimes difficult to cure his painful and unpleasant sensations by moral suasion, it is usually easy to dissipate for a time at least the erroneous and harrassing ideas (phobias) to which these sensations give rise." Dejerine and Gauckler[1] and Pollock[3] stated that these phobias are amenable to re-education and explanation. Those who hold that they are either not further reducible or are caused by suppressed ideas (Freud and his followers) have quite different views as to the method of eradication. They hold that mere explanation, persuasion, etc., are insufficient weapons for the purpose; eradication according to their view is accomplished after a process of psychoanalysis—that is, an attempt to find the repressed ideas or emotions and bring them forth into consciousness.

The views of these various writers may be used as a method of approach in the study of the subject. Phobias may be examined from the standpoint of whether or not they have an obvious, understandable, logical systematized cause, and whether or not adequate explanation is sufficient to eradicate them. It was with these possible differences in mind that the present study was undertaken, and an attempt was made to determine whether these factors

differ in the phobias that occur in the neuroses and in those that occur in the psychoses, and if these differences may be utilized as an aid in making a diagnosis.

## PHOBIAS IN THE PSYCHONEUROSES.

In the 733 cases of psychoneurosis studied phobias occurred in 48 per cent.

The most common fear found in this series was the *fear of becoming insane*, which occurred in 151 instances. Its appearance was always due to the fact that the patient misinterpreted some sensation or experience as indicative of impending loss of mind. The most usual misinterpreted factor was the feeling of cephalic discomfort (pressure, heaviness, fullness, tightness, etc.); less commonly it was insomnia, restiveness, nervousness, and quick irritability. Still less frequently insanity occurred in the family of the patient, and the patient felt that the symptoms were surely the beginnings of the same trouble. Other rarer factors which the patient interpreted falsely as indicating impending loss of mind were worry, dizziness, head tremor, occasional feelings of confusion, bewilderment or daze, occasional spells of panic, masturbation, impotence, cessation of the menses, and tinnitus. In view of this it seems not unreasonable to believe that the fear of insanity in psychoneurotics is not a causeless, isolated, incomprehensible phenomenon; the patient has good reasons for the belief that insanity is impending, and this conviction is understandable; it has an obvious and palpable cause, and that cause is the misinterpretation of a sensation or experience. We shall see in the further study of phobias in the psychoneuroses that this relationship will obtain.

The *fear of physical disease* was found in 141 psychoneurotics. The fear of heart disease was the most frequent. It was found in sixty cases, and had its genesis mostly in misinterpretation of an occasional attack of palpitation, or a sense of heaviness, discomfort or constriction about the heart, or in an occasional spell of giddiness or weakness. Sometimes the fear was of some abdominal disease, and an unpleasant abdominal sensation was the cause. Seventeen patients feared an oncoming stroke; here, head pressure, or feelings of general weakness, or peculiar sensations in the arms and legs were the misinterpreted factors. More rarely there appeared fear of tuberculosis, goitre, epilepsy, general paresis, deafness, paralysis agitans, blindness, brain tumour, Bright's disease; but in each case the fear was caused by a misinterpretation of physical sensation such as a feeling of constriction about the chest or throat, trembling spells, pressure in the head, tinnitus, peculiar sensations in the abdomen, asthenopia, and frequent urination. Here too there were no incongruities, no incomprehensibilities, no imponderables; the occurrence of the phobia was predicated entirely on the misconstruction of a coexisting physical sensation.

The *fear of impending death* occurred in 90 cases, and in not a single instance was an obvious cause absent. Often a distressing experience was

responsible, such as an attack of palpitation, a feeling of faintness or weakness, the feeling of pressure in the head increasing to unbearable proportions, a sense of constriction in the throat or precordium, or a spell of panic. In other instances this phobia owed its genesis to a pre-existing phobia of a fatal physical disease, most commonly heart disease, less often abdominal disease, or a stroke of apoplexy. Here we observe a phobia originating in another which itself was based on a peculiar sensation or experience ; we witness the elaboration of a phobia from a pre-existing phobia ; this process, we shall see, is not at all rare in the psychoneuroses.

The *fear of falling, collapsing, fainting or becoming unconscious* was present in 58 instances, and in all the factor that gave rise to the fear was readily apparent. It was a distressing physical sensation such as palpitation of the heart, weakness, tremulousness, blurring of vision ; or it was based on other phobias such as the fear of heart disease or the fear of choking, these last having themselves been elaborated from distressing physical sensations.

The *fear of being alone* (claustrophobia) was found in 52 cases. The cause was always found in a pre-existing phobia. The phobia of sudden death was the most frequent cause, next came the fear of collapse, and the fear of becoming insane. It is quite understandable that an individual who is afraid that he may collapse, die, or go insane may also be afraid to be alone lest he should be without aid in these emergencies.

The *fear of public places, streets, crowds, common carriers, poorly ventilated places* was observed in 106 cases. Here too the cause was invariably a pre-existing phobia, such as the fear of collapsing, fainting, dying, making a scene, choking amongst strangers, or being beyond the reach of quick aid in such circumstances.

The *fear of killing or harming others* was found in 14 psychoneurotics and was always based on the fear of impending loss of mind ; the same phobia was responsible for the 18 instances in which the individual feared that he might harm himself. The *fear of high places* was found in 16 instances, and it was always an elaboration of another such as that of becoming insane or uncontrolled, and jumping ; or that looking down might cause a faint. The *fear of sharp instruments* or weapons was found in six ; in all it was conditioned by a fear of insanity or of losing control of one's self and of using weapons in such conditions with damaging effect. The *fear of choking* was found in 21 cases of psychoneurosis, and was always based on a peculiar sensation, such as tightness or constriction in the throat or chest.

Some of the rarer phobias occurring in this series of psychoneurotics were the fear of leaving things undone based on difficulty of concentration ; of sun and heat, based on a previous sunstroke ; the fear of noise, based on noise aggravating the sensation in the head ; a fear of the condition being hopeless, in ten instances, due to the phobia of having an incurable physical disease.

A consideration of the above tends to show that phobias in the psycho-

neuroses* are adequately caused, logical, understandable, systematized. They arise either from the misinterpretation of some physical sensation or experience or as elaborations from other phobias, which in turn developed out of the misconstruction of physical sensations. They are not isolated, incomprehensible phenomena, their genesis is simple and direct; the object of the phobia is always a logical one. The cause is usually contemporaneous with the phobia or may just precede it.

After this criterion of a phobia occurring in the psychoneuroses—viz., that its cause is obvious and easy to detect, adequate, logical, understandable, and systematized—was established, the phobias in other states were studied to see how they compare with this standard.

## PHOBIAS IN MANIC-DEPRESSIVE PSYCHOSIS.

In the 672 cases of manic-depressive psychosis studied phobias occurred in 65 per cent.

In 17 instances there was found a *fear of an unknown*. The individual was afraid, but of what, could not be determined. Here is something different from that described above; here is a fear without a demonstrable cause and without an object—an incomprehensible fear. This is entirely foreign to anything found in the psychoneuroses; it is, it seems to me, the fear of a psychotic state.

The *fear of having an incurable disease* was found in 78 cases. It will be recalled that an identical phobia was found in ten cases of psychoneurosis, in which it was always an elaboration of the fear of having an incurable physical disease, which in turn was based on the misinterpretation of some peculiar physical sensation. But in the manic-depressive cases in which the same fear occurred, no such cause was in evidence. What gives rise to this fear in manic-depressives is hard to say; perhaps it is darkness of mood, but whatever it is is not exactly clear, it is conjectural; there is, in other words, something incomprehensible about it.

Among other illogical, incomprehensible, bizarre, vaguely conditioned fears found in the cases of manic-depressive psychosis may be mentioned that

* In 19 of the patients with psychoneurosis it was found that phobias had been present since childhood. In some the cause could not be ascertained because the incident responsible had long since been forgotten; in other cases it was found in some incident that took place very early in the patient's life, and recalled either by the patient or a relative as in the following instance:

An 18-year-old girl had had as far back as she could remember a fear of butterflies. She was brought to the consulting-room as, on a trip to Chicago the day before, she had been about to jump out of an automobile going at the rate of 40 miles per hour because a butterfly flew into the car. Inquiry from the mother elicited the fact that when the patient was 18 months old, long before she could remember, she was badly frightened by a butterfly alighting near her, while she was lying in a crib. From this and similar instances it seems reasonable to believe that phobias commencing very early in life and having no apparent rational basis are not illogical phobias; the circumstances that gave rise to them have been forgotten, but later the offending objects cause fear just the same.

of never being able to fall asleep (three cases); fear of being unable to die (three cases); fear that a wet cuff will injure someone (one case); fear of contaminating others with disease (two cases); of putting harmful substances in edibles (four cases); of becoming blasphemous (one case); fear of its being the year 1921 (one case); fear of being injured by dirt in food (two cases); of not having turned off gas or locked doors (one case).

Logical, understandable fears were found in manic-depressive psychosis also. Thus in 152 instances the *fear of impending insanity* was present. The cause of this is somewhat different from what obtains in the psychoneuroses; in the latter, one symptom is usually picked out as its cause, such as head pressure, insomnia, difficulty in concentration; in manic-depressive cases the stated origin does not appear to be so precise; the patient appears to develop it from the general change that has come over him.

*Fear of poverty for self and family and of business failure* was found in 34 instances. In view of the fact that the patient usually realizes that he cannot attend to his business as well as formerly, this fear must be considered logical. It was not discovered in a single instance among the psychoneuroses. *Claustrophobia* was present in ten cases, and was always understandable since it was based on a pre-existing phobia such as that of impending death or insanity. *Fear of harming others* was found in two instances, originating in a pre-existing phobia of impending insanity. *Fear of physical disease* (15 cases) was based on the misconstruction of a physical sensation, and fear of impending death in ten instances arose in the same way.

## FEARS IN DEMENTIA PRÆCOX.

Fears were found more rarely in dementia præcox than in the conditions discussed above. Among the 544 cases they were present in 54. In only 17 of these was the phobia considered understandable; these were examples of the *fear of impending insanity;* here too it had its genesis in insomnia, a feeling of pressure in the head or difficulty in concentration. The remaining 37 fears were without obvious or adequate cause. *Fear of contaminating others with germs of disease* was noted in seven instances and led to excessive hand-washing or desire for separate utensils, towels, etc. A similar phobia was not found in a single case of psychoneurosis. The *fear of death* was present in six cases, the *phobia of physical disease* in five; in neither group was there any obvious cause. The other apparently causeless fears noticed in this disorder were the fear of putting pins and glass in edibles, of batteries, of falling asleep, of noise, of being alone because the patient was ashamed of her appearance, of an unknown, of striking people in the street, of talking in a low voice, of not walking straight, of eating when in a sitting position, of eating oranges and apples, of not getting out of bed until a street car passed, and of a thing not being done right unless it was done twice.

## TREATMENT.

The treatment of patients with phobias also brings out some points of value in differential diagnosis. A phobia in dementia præcox or manic-depressive psychosis can rarely if ever be dispelled through reason. In the psychoneuroses the phobia may often be dispelled by reason alone or combined with normal behaviour despite the patient's sensations. In manic-depressive psychosis and in dementia præcox a fear cannot be counteracted by making the patient face it. The same fear recurring at intervals of months is usually indicative of a recurrent depression. In the psychoneuroses the whole picture is built around fear, in manic-depressive psychosis and in dementia præcox this symptom is only a small part of a larger clinical syndrome; there are many other complaints, but a psychoneurotic subject is concerned predominantly with his phobia.

## CONCLUSIONS.

Phobias in the psychoneuroses have an obvious, adequate, understandable, logical, easily detected cause, and a clearly stated object. Such fears may also occur in the psychoses, but there illogical fears, fears having no obvious or adequate cause and sometimes no object, are found. The detection of an illogical or inadequately caused fear is at once evidence that the condition in which it is found is a psychosis. Phobias occurring in the psychoneuroses are eradicable by reason, explanation, and by having the individual face the fear. Phobias in manic-depressive psychosis or dementia præcox, whether logical or illogical, are not eradicable by such procedures. It is thought that these factors may in doubtful cases help to clear up the point whether one is dealing with a neurosis or a psychosis.

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# Short Notes and Clinical Cases.

## A CASE OF INFANTILE HEMIPLEGIA ASSOCIATED WITH FACIAL NÆVUS AND MENTAL DEFECT.

By

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The following example of the now familiar syndrome which is characterised clinically by infantile cerebral hemiplegia in association with a contralateral capillary nævus of the skin appears to differ from all previously reported cases in that, notwithstanding the marked degree of cutaneous involvement, the pathological changes found after death were hardly visible to the naked eye.

### REPORT OF CASE.

The patient, M. B., a girl, age 17, was admitted to hospital on September 22, 1926. Her mental state was one of low grade imbecility; she was faulty in her habits, destructive, and capable of saying only a few words.

An extensive capillary nævus of the 'port-wine' type was present over the greater part of the left side of the face and scalp, on the left scapular region, and on both legs.

On the face the nævus was sharply defined, reaching slightly beyond the middle line in the region of the nose (fig. 1). On the scalp it extended backwards as far as the vertex. The chin and submental region showed only irregular blotching of a colour somewhat lighter than that elsewhere. The scleral vessels at the inner and outer canthus of the left eye were slightly varicose and markedly injected. The mucous membrane of the left cheek and of the left side of the palate was nævoid; on the hard palate the nævus reached accurately to the median raphe.

The left side of the face was also slightly larger than the right, the left eyebrow on a higher horizontal plane than the right, the tissues of the left cheek were thicker and the left half of the upper lip more prominent than the corresponding parts on the opposite side.

*Central nervous system.*—Pupils equal; reactions to light and accommodation normal: other cranial nerves normal.

The right limbs were almost completely paralysed and spastic. The right upper limb was in close juxtaposition to the trunk, flexed at the elbow with the hand in a position of extreme flexion; the lower limb was extended with the foot in the position of talipes equinovarus.

Abdominal reflexes present. Plantars: right extensor response; left normal. Right knee jerk brisker than left.

The patient was subject to epileptic convulsions of the Jacksonian type commencing near the angle of the mouth. At the onset of an attack the head and eyes turned to the right followed by tonic and clonic movements of muscles on the right side.

In October 1927 the patient commenced to have fits in large numbers and finally died convulsed on November 1, 1927.

## PATHOLOGICAL FINDINGS.

*Post-mortem examination.*—No changes of importance were found in the visceral organs. The calvarium and dura mater were normal. The brain was small and showed marked asymmetry, the left cerebral hemisphere being

FIG. 1.—The patient, showing distribution of facial naevus.

considerably smaller than the right: its weight was 40 oz. The pia mater was slightly congested and thickened, especially in the neighbourhood of the great longitudinal fissure. Over the frontal and parietal convolutions of the left hemisphere there was a noticeable fulness of the veins, but careful scrutiny failed to reveal anything in the nature of an angioma (fig. 2). A decided roughness, however, could be felt beneath the pia arachnoid covering the upper end of the gyrus centralis, and a vertical coronal section showed that the cortical grey matter in this situation was infiltrated with minute gritty particles (fig. 3).

FIG. 2.—Cerebral hemispheres viewed from above. The scale lies over the frontal lobes. No nævus can be seen.

An additional point of interest was the smallness of the left optic nerve and tract in comparison with those of the opposite hemisphere.

*Microscopical Examination.*—In the superficial layers of grey matter at the upper end of the gyrus centralis and to a lesser extent in the posterior end of the superior frontal gyrus, there was a rich deposit of spherical, oval and mulberry-shaped masses of inorganic substance (fig 4). In areas a little

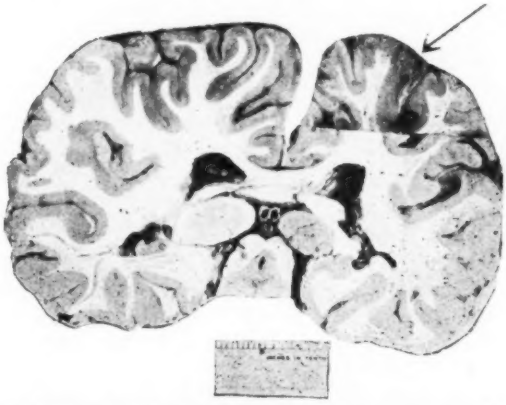

FIG. 3.—Vertical coronal section to display infiltration of upper end of precentral gyrus with calcareous deposit (arrow). Note inequality of hemispheres.

further away numerous capillaries outlined by granules could be seen. Chemical analysis of the affected brain cortex showed that the deposit consisted almost entirely of calcium in the proportion of 123 mgm. of metal per 100 grm. cortex. In areas where the deposit was particularly dense the grey matter showed no details of structure and contained minute foam-like spaces. Individual nerve-cells were well preserved, but there was considerable disturbance of cell lamination in the affected area and poverty of nerve-cells was obvious in most laminæ; in the precentral gyrus the Betz cells showed a marked numerical deficiency.

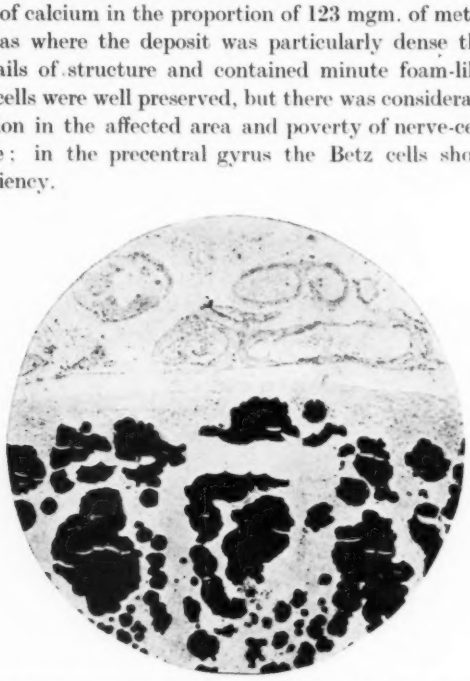

FIG. 4.—Low power view of upper end of gyrus centralis showing masses of calcium salts lying in the superficial layers. Lying in the pia-arachnoid is a small arteriole with uneven development of its wall. This is better seen in the next figure.

No angiomatous vessels could be found in either the grey or white matter, but in the pia mater vessels showing definite abnormality were noted. In this situation the minute arterioles displayed great variations in the thickness of their walls (fig. 5). Apart from this there was no indication whatever of abnormal vascular changes.

## DISCUSSION.

In its clinical aspects the case conformed closely to those reported by other writers. The patient was mentally defective, and from an early age had been subject to epileptic fits of the Jacksonian type. An extensive capillary nævus was present on the greater part of the left side of the face and on certain parts of the trunk and limbs. On the right side there was an incomplete hemiplegia. No skiagrams were taken of the patient's head, but in view of the similarity of the case to that reported by Kalischer[1] and others

it was confidently anticipated that the post-mortem examination would reveal an extensive leptomeningeal angioma on the left side of the brain and its failure to do so gave to the case its chief interest. Apart from a moderate degree of thickening and congestion of the pia-arachnoid, inspection of the convex surface of the brain revealed nothing of importance and it was only by careful palpation that evidence of an underlying pathological condition was revealed. In an area limited to the upper end of the precentral gyrus and the grey matter of the adjacent superior frontal gyrus, a deposit of gritty material was discovered which on microscopic examination proved to be composed of minute particles of calcium salts. In the pia-arachnoid covering this area there were present several small vessels with faulty development of their walls. *These constituted the sole evidence of angioma.*

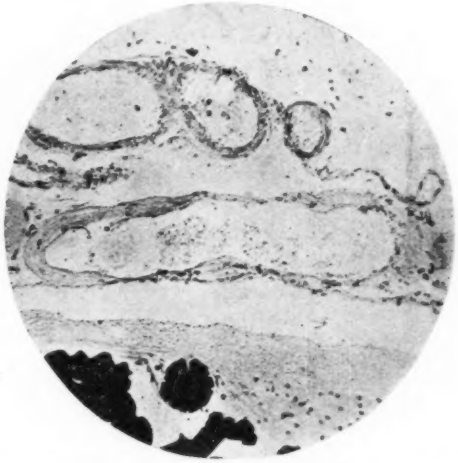

FIG. 5.—Higher magnification, showing the abnormal pial vessel seen in fig. 4.

As already mentioned the left cerebral hemisphere was considerably smaller than the right. This abnormality, which was present in Kalischer's case and in the first case reported by Cushing[2], occurs on the same side as the facial and leptomeningeal angioma—an association which suggests that the latter may in some way be responsible for both the cerebral hypoplasia and the contralateral hemiplegia.

In the case reported above, however, where no angioma visible to the naked eye could be found, such an explanation is clearly inadmissible. Moreover, in the writer's experience inequality of the two cerebral hemispheres is not an uncommon finding in the brains of persons who exhibit mental defect without cutaneous nævus; the condition seems to be the result of a simple developmental arrest, and when associated with congenital infantile hemiplegia, as is

often the case, examination of the cortex reveals little else than paucity of the cortical neurones. It seems likely, therefore, that the meningeal angioma is an associated developmental anomaly which has nothing to do with either the mental defect or the infantile hemiplegia.

## SUMMARY.

Examination of the brain of an imbecile girl, who during life exhibited an extensive capillary nævus of the skin with contralateral hemiplegia, revealed no macroscopic evidence of angioma. The pathological changes were limited to a small area of the cortex and consisted of a few minute vessels with imperfect walls and a rich deposit of calcium salts in the grey matter.

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# THE LAWRENCE-BIEDL SYNDROME.

By

GWENVRON M. GRIFFITHS, Cheddleton.

Of recent years there have been reported in continental and American literature a number of cases showing an association of adiposity, polydactyly, retinitis pigmentosa and mental retardation, often among several members of a family. The descriptions given by various authors show a remarkable similarity, not only in the main features of the condition, but also in minor characteristics, and the case I have to describe is typical in this respect.

## PERSONAL CASE.

Helen H., age 5, was admitted as an imbecile. The family history on the father's side is negative. The mother is one of four children; her elder brother had two thumbs on one hand. She is plump, a tendency which runs in the family. She had six pregnancies—(1) a girl, age 10, is normal mentally but has webbed toes on each foot; (2) a girl, also has webbed toes; (3) a boy of 6, quite normal; (4) the patient; (5) a boy, who died when 10 days old of bleeding from the nose, mouth, and rectum, and who had six fingers on each hand and six toes on each foot; (6) a boy, stillborn, with a deformed head.

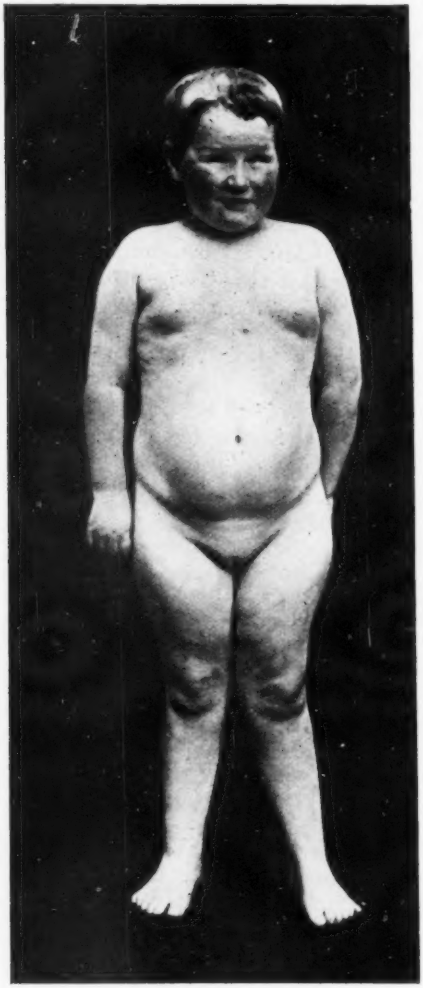
The patient was a full-term child weighing 12 pounds and the mother says it was an easy confinement. Squint and nystagmus were noticed soon after birth. The child grew rapidly, but required no more feeding than others. She had two teeth at seven weeks. She started walking at two, but did not talk till four. The only illnesses were whooping cough and bronchitis.

She is a tall child with marked adiposity. Her height is 111 cm. (3 ft. 7 in.) and weight 28 kg. (4 st. 3 lb.). Her face is full but not puffy; she has red cheeks and delicate features. The obesity is most marked round the mammæ, abdomen and thighs, lessening towards the extremities. The skin is soft, cold and glabrous, and the hands and feet tend to be blue and puffy. The hair of the head is fine and dry; there is very little on the body and the eyebrows are scanty. The head is large, with big parietal eminences, circumference 52·8 cm. (21 in.). The fingers are tapering with incurving of the little finger, on the outer side of the proximal phalanx of each of which is a small fleshy mass. Each foot has six toes, with the second and third webbed. There is some genu valgum and flat foot. The heart and lungs are negative and reflexes are normal.

There is internal strabismus of the right eye, and nystagmus of the left. A condition of hemeralopsia is present. Objectively, a concentric diminution of the visual fields is apparent to rough testing. The discs are pale, with pigmentation round the right disc, but there is no typical retinitis pigmentosa.

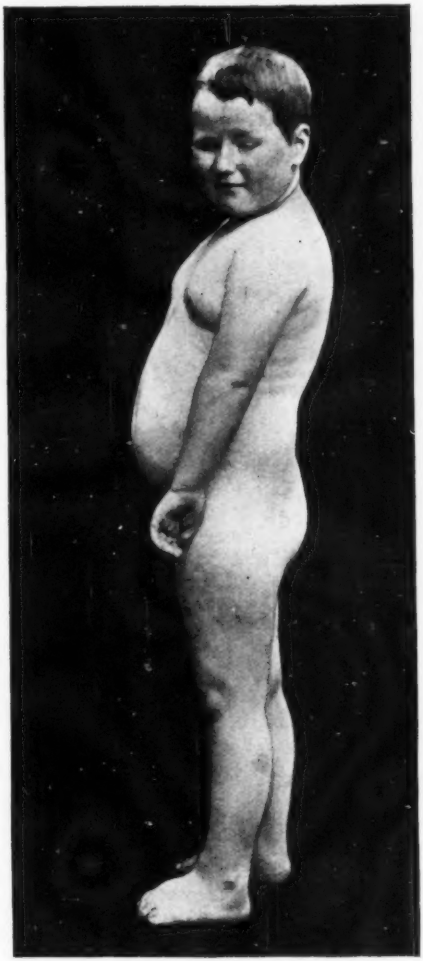
Mentally the girl is lethargic, appears to take little interest, and often will not answer questions, though some of her voluntary remarks indicate that she takes more notice than is apparent. She will sit for hours looking at pictures, or will stand quite still doing nothing. She is emotionally labile, but usually placid and contented, with occasional outbursts of temper. She has no abnormal craving for food or drink, but has a good appetite. She is clean and tidy.

Radiographic examination of the skull shows an abnormal outline with normal density of bone. The pituitary fossa is small with a high, somewhat thickened dorsum sellæ. The foot shows five metatarsals, but the fifth metatarsal articulates with two sets of phalanges. There is no bony syndactyly. The hand shows no bony outgrowth corresponding to the sessile mass. The ossification of the carpus is that of a child of seven or eight.



The blood sugar curve shows a slight increase of tolerance. The urine is normal. Blood calcium is 13 mg. per 100 c.c. The blood count shows a mild leucocytosis with

relative lymphocytosis. W.R. is negative. Cushing's thermic reaction was tried; the injection of 1 c.c. of anterior pituitary preparation resulted in a rise of temperature of 1 degree, and three and a half hours later a rise of pulse rate from 80 to 110, this lasting two hours.



Thyroid treatment had no effect, and whole pituitary tablets have had no noticeable effect in six months. During this period the patient has grown 3 cm., but the weight has been stationary. The second incisors have appeared.

## DISCUSSION.

The association of retinitis pigmentosa with polydactyly and other forms of congenital malformation has long been recognised, as has its familial character, so that the eye condition may be regarded as an inborn tendency to defect. In 1866 Lawrence and Moon described in four members of a family the occurrence of obesity, with genital underdevelopment, retinitis pigmentosa and other imperfections of body and of mind. A single case was reported by Bartolotti in 1914, with adiposogenital dystrophy, retinitis pigmentosa and polydactyly. He suggested that there was a premature synostosis of the basisphenoid, causing an abnormal influence on growth of the primordial hypophysis.

Bardet in 1920 described a typical case, collecting others more or less complete. He considered the whole syndrome to be due to a pituitary alteration occurring during the embryonic period, attributing to the anterior pituitary the control of the skeletal development of the extremities, on analogy with the bony changes of acromegaly, and referring to certain cases of polydactyly in which destruction of the pituitary had been found. In this connection we may mention Hastings Gilford's reference to Goliath's brother's son, and to other cases of gigantism with polydactyly.

In 1922, Biedl described the syndrome as a new entity, separating it from Fröhlich's syndrome as one of a primary cerebral adiposity as distinct from a primary hypophyseal obesity. Raab, in his study of adiposity in 1924, described Biedl's cases and quoted others. He suggests an inborn tendency to the retinal condition, which usually develops sometime in childhood, and he remarks that adiposity often follows on acute illness. He regards the process as one of congenital malformation of the skeletal system with a tendency to internal hydrocephalus, causing pressure on the diencephalic metabolic centres, and impairment of the vascular supply to the retina. However, he also considers the possibility of an abnormally shaped dorsum sellæ interfering with the secretory pathways from the pituitary body to the third ventricle, thus acknowledging a possible, though perhaps secondary role to the pituitary in the production of the syndrome.

In 1925, Solis-Cohen and Weiss described four cases in a family (strangely, most of the American cases seem to be in families of Italian origin). They made metabolic studies with anomalous results, and they follow Raab's theories of causation. They gave the syndrome the names of Lawrence and Biedl. Rieger and Trauner, in their study of a case, base a theory of causation on the known heredofamilial character of several of the symptoms, seeing in it the coupling of various inborn factors. In their case there was consanguinity, but this is unusual. Cases have been described more or less fully by several other writers.

In this syndrome we evidently have a heredofamilial tendency to developmental errors which arise in the earliest period of intrauterine life. Whether the error can be wholly attributable to the pituitary or to diencephalic centres is doubtful ; in any case its influence is progressive, as some of the symptoms may not appear till later, up to the tenth or fifteenth year. In favour of a pituitary implication we have the anomalies in height. In older subjects dwarfism is marked (six cases out of eight) but in those under 16 we have eleven tall to five dwarfed. This would suggest a preliminary overactivity of the growth-promoting hormone of the pituitary, with later deficiency. Genital dysplasia is usual but not invariable. Glucose tolerance has been found increased or diminished in about equal numbers. Polyuria has been noted rarely. A positive thermic reaction, diminished B.M.R., and a relative lymphocytosis may be evidences of pituitary dysfunction, but the interpretation of these metabolic findings is open to question. The Wassermann reaction is negative in the 16 cases in which it has been recorded.

The retinal condition is usually described as an atypical retinitis pigmentosa ; often there is also some optic atrophy, cataract, squint or nystagmus. Hemeralopsia is usual. There is no evidence of tumour (except in Bartolotti's case) or of definite hydrocephalus. The sella is usually small or normal in size with a thick or high dorsum, which has been invoked as a causal factor in the interference with neurohypophyseal mechanisms. The mental torpor might hypothetically be associated with the sleep centres round the third ventricle, which area is credited by some with the control of fat and sugar metabolism.

The further study of this syndrome may give useful help in solving these problems of growth and metabolism.

I owe my grateful thanks to the Medical Superintendent, Dr. W. F. Menzies, for permission to publish this case.

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# Critical Review.

## THE NERVOUS SYSTEM IN REACTIONS OF THE HIGHER ANIMALS:

**A critical review of recent work on the physiology of the nervous system.**

By

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Attention is now being directed to the concept that human behaviour is determined to a great extent by spatiotemporal relations of the external world. While physicists are tending to consider space and time as fundamental realities of the objective world, physiologists and psychologists are beginning to investigate the part played by space and time factors in reactions of the higher animals. The work of Pavlov on the function of the cerebral cortex, the recent researches of Sherrington on the nervous system, and the investigations of Lashley and of Köhler on animal reactions have in common a widening of our view of reflexes in the higher forms of animal life. Certain points of contact in the work of these investigators are here indicated.

In emphasizing the fact that an animal reacts to a complex environment as a functional whole, Köhler[1] says: "Instead of reacting to local and mutually independent events, the organism reacts to an actual *constellation* of stimuli by a total process which, as a functional whole, is its response to the whole situation."

A constellation or set of stimuli possesses definite spatiotemporal relations, and these are said to enter fundamentally into the reaction of an individual to that set of stimuli. Köhler suggests that in the physiological processes of a reacting individual there are reproduced the relations of the set of stimuli evoking the reaction. Thus to a unit, e.g. a physical object, of the external world there will correspond a *dynamic* unit in the physiological processes of an individual reacting to ('aware of') that object. The relations of the dynamic unit in the physiological processes will be congruent or 'isomorphic' with the relations of the physical object. According to Köhler, this is the basis of the

organization in an individual's sensory field of units corresponding to physical units of the external world. He says[2]: "Some definite relations among the stimuli as they issue from the physical object, and the preservation of these relations in transmission [to the brain of the reacting individual] seem to be an essential condition for the organisation of [sensory] units corresponding to objects in the outer world." It is possible to trace in recent physiological research considerable support for this conception.

Taking first the work of Pavlov on conditioned reflexes, we find a great amount of experimental work on the reactions of animals to complex objects and events of the external world. Pavlov has found that any agent in nature may be used as a stimulus for a conditioned reflex, provided that the organism possesses the requisite organs for the perception of such an agent. Elaborating this statement, he[3] writes as follows: "We can, in the first place, divide up natural agencies into their ultimate component parts as regards their properties as physiological stimuli. . . . On the other hand, the animal may be affected by the sum total of numerous elementary stimuli *acting together as a whole*. For example, in distinguishing facial appearance we take into account simultaneously *form*, *dimensions*, shades, colours. We behave very much in the same way when making out our direction in a more or less familiar neighbourhood. Such examples of *compound stimuli* can be multiplied indefinitely. . . ." (italics mine).

Here the influence on an organism of the spatial relations of its environment is plainly indicated, as is the fact that a component of the environment, acting as a unit or whole, may initiate a reflex. Pavlov[4] adds that "innumerable individual fluctuations in the external and internal environment of the organism may, each and all of them, singly or collectively, being reflected in definite changes in the cells of the cerebral cortex, acquire the properties of a conditioned stimulus." The effect of *change* in an organism's environment, as here emphasized, implies that dynamic spatial and temporal relationships of the outer world influence an organism's reactions, and the reflection of these dynamic relationships in the physiological processes of the organism is definitely maintained.

The effect of temporal relations of the environment is described by Pavlov[5] in dealing with inhibition: "The first point of importance in the establishment of a conditioned inhibition is its dependence on the time relations between the applications of the two stimuli in the inhibitory combination."

As already mentioned, the effect on animals of natural agents with certain mutual relations has been studied experimentally by Pavlov, who has termed these agents 'compound stimuli.' In his laboratory, conditioned reflexes were produced by such signals as the simultaneous combination of a touch and a sound, and also the combination of a light and a musical sound. The extremely interesting discovery was made that while a combination of environmental units could initiate a conditioned reflex, each separate unit of that combination could by itself produce the opposite effect, viz. inhibition of the

conditioned reflex. Here again the effect on an animal of an environmental component is shown to depend on the grouping together in space and time of the various elements of that component. Many kinds of compound stimuli were employed by Pavlov, such as the repetition of a certain stimulus (e.g. a tone), with different intervals of time between the applications of the stimulus, making a certain order of pauses between the repetitions. In other experiments various kinds of stimuli made up the compound (e.g. four different tones of an octave, or different sights and sounds). Then, writes Pavlov[6], "the next step was the introduction of different modifications of these compound stimuli. In the first case the order of the two pauses between the repetitions of the tone was reversed. . . . In the remaining cases the order in which the different stimuli were applied was changed. . . . These modified compounds were repeatedly applied without reinforcement [by the unconditioned stimulus], but when the stimuli were applied in their original order the compound was always reinforced, with the result that ultimately the original compounds became differentiated from their modifications, which latter finally lost their positive conditioned effect and acquired an inhibitory one." We see here that the order of application of the elements of a natural agent (compound stimulus), that is, the mutual spatiotemporal relations of those elements, determines the response of the organism.

Pavlov's work not only demonstrates experimentally the determining effect on animal reactions of spatiotemporal relations of the environment, but also shows that the same reaction may be produced by similar, but not necessarily identical components of the environment of an animal. Pavlov[7] expresses this fact as follows:—

"Natural stimuli are in most cases not rigidly constant but range around a particular strength and quality of stimulus in a common group. For example, the hostile sound of any beast of prey serves as a conditioned stimulus to a defence reflex in the animals which it hunts. The defence reflex is brought about independently of variations in pitch, strength and timbre of the sound produced by the animal according to its distance, the tension of its vocal cords and similar factors."

A corollary of this fact (of similar components of the environment producing the same reaction in an animal) is that similar but not necessarily identical spatiotemporal relations of the environment may produce the same reaction.

The theory of conditioned reflexes provides a possible explanation of this fact, by the light which it throws on brain function. When a conditioned reflex is first formed to a certain stimulus, it can be also evoked by allied stimuli—those affecting the same sense of the animal, more or less similar to the first stimulus. This is what Pavlov calls 'generalization of stimuli,' and appears due to an *irradiation of excitation* from a point of the cerebral cortex affected by the first stimulus. Pavlov[8] gives the following example of irradiation of cortical excitation:—

"If you form a conditioned reflex, for example, to the ticking of a metro-

nome, and then try other sounds, you will find that these other sounds at first also produce the salivary flow. Consequently the stimulation from a certain group of cells irradiates over a large part of the cerebrum, and therefore every other auditory stimulus provokes the secretion of saliva. If you make a conditioned stimulus from a tone of 1,000 vibrations, and afterwards try other tones of various vibrations, all of them have an effect. The same holds true for other conditioned stimuli."

This irradiation of excitation in the cortex has its counterpart in *concentration* of excitation, in which " the irradiated excitation gathers along certain lines and towards certain foci " (of the cortex). When concentration occurs, other (similar) stimuli fail to evoke the conditioned reflex, only one particular stimulus producing it.

Irradiation and concentration of excitation are constantly occurring in the cerebral cortex, with the result that on the one hand an animal reacts in the same way to similar stimuli (with similar spatiotemporal relationships), and on the other hand ' discriminates ' between units of the environment by reacting only to one particular stimulus. Irradiation and concentration of cortical inhibition also occur, as the opposite and complementary process to excitation.

Similarities and differences in human behaviour may perhaps be partially and provisionally explained by the process of irradiation and concentration of excitation and inhibition in the cerebral cortex. According as excitation irradiates or concentrates we do or do not react to units of the environment possessing certain relations. As inhibition irradiates, an individual fails to react to stimuli which would otherwise be effective.

The conclusion that similar relations of the environment may produce the same reactions in individuals is reached by K. S. Lashley from his own experimental work on brain function. Lashley[9] describes this conclusion as follows :—

" In so far as we can define them, ' intelligent ' acts are those dealing with relationships rather than with concrete units. Insight consists of the *identification of two systems of elements through common relationships among their parts.* It is, I think, certain that these relationships are not patterns of identical elements, but are, rather, *similar relations subsisting among dissimilar elements.* There is no possibility of reducing association by similarity to the excitation of the same synapses or reflex arcs. A theorem applied to the solution of a problem in geometry may differ in every detail from the statement of the problem and yet be immediately associated because of common spatial relations involved " (italics mine).

A neurological basis of reactions to relationships is suggested by Lashley[10] as follows :—

" Neurologically these relationships must be in the nature of *ratios of excitation*, patterns without a fixed anatomical substratum, since the sensory

and motor elements of a situation may change fundamentally without altering its logical significance.

" We seem forced to the conclusion that a final common path may somehow be sensitized to a pattern of excitation so that it will respond to this pattern in whatsoever part of the nervous tissue it may occur. In the simplest cases the relationships forming the basis of reaction seem expressible as *ratios of intensity of excitation ;* in others, as *ratios of spatial extent or temporal distribution* " (italics mine).

A comparison regarding the neurological basis of reactions in the higher animals can be drawn between Lashley's concept of ratios of intensity of excitation in the nervous system and Pavlov's theory of irradiation and concentration of cortical excitation. According to Pavlov, the cerebral cortex is a mosaic of areas of excitation and inhibition which are constantly changing as stimuli from the external world affect the cortex. If irradiation and concentration of excitation around focal points of the cortex are constantly taking place, there will surely be ratios of intensity of excitation in the cortex, for example, between the focal point of an irradiating area of excitation and its periphery. The concept of ratios of intensity of excitation (corresponding to relationships among external stimuli) implies the existence of *degrees* of excitation in the nervous system, and references to such are indeed to be found in Pavlov's[11] writings. Further research into the nature and function of the nervous system, particularly the cerebral cortex, will no doubt bring to light the physiological processes underlying reaction to spatiotemporal relations of the external world. Meanwhile the known facts point to the importance of dynamic relationships in the distribution of excitation in the central nervous system.

Already there is evidence of processes in the central nervous system other than the mere conduction of nervous impulses. The work of Sherrington and Fulton shows that nerve impulses undergo modifications in the nerve-cells, and that in the nerve-centres summation of states of excitation and inhibition can occur. In his Ferrier Lecture (1929), Sherrington[12] says : " Though trains of impulses are the sole reactions which enter and leave the central nervous system, nervous impulses are not the sole reactions functioning within the system. States of excitement which can sum together and states of inhibition which can sum together, and states which represent the algebraical summation of these two, are among the central reactions." Sherrington and Fulton[13] conclude from recent experimental work : " It is in nerve-centres that functional study finds evidence of forms of reaction which summate, that, is can add themselves together both in space and in time, which nervous impulses cannot do."

We see here that space and time factors appear as particularly significant, even though as yet but dimly outlined. The above conclusions may be compared with the concept of sets of external stimuli, the relations of which determine an organism's reactions, possibly by the production of corresponding relations in physiological processes of the organism's central nervous system. If, as Sherrington declares, states of excitation (and of inhibition) in the central

nervous system are capable of summation in space and time, then it would appear that in the nervous centres there must be ratios of intensity of excitation, and also definite spatiotemporal relations in the distribution of excitation in those nervous centres. Whether such ratios and spatiotemporal relations are congruent with the relationships of the sets of stimuli of the external world affecting the nervous centres remains to be proved.

It is not only in nerve-centres that space and time factors have recently been shown experimentally to play a highly important part, for the researches of Adrian have demonstrated the significance of a time factor in the transmission of impulse along nerve fibres. Adrian[14] makes the following statement (to which he attaches certain limitations): "Provided there is nothing to distract our attention, the intensity of the sensation at any moment turns out to be proportional to the frequency of the impulses in the sensory nerve-fibre." Furthermore, Adrian has found in his experiments that the effectiveness of a stimulus depends on the rate of change in the environment as well as on its extent. This, he[15] says, "applies to mechanical stimuli as well as to electrical, for a gradually increasing pressure on a nerve is far less effective than a sudden blow . . it applies also to the sensory nerve-ending under its natural conditions and has an important influence on the nature of the messages which the brain receives from the sensory organs."

It appears then that from nerve-ending to nerve-centre, spatiotemporal relations—rates, ratios, and spatial distribution—of nervous processes underlie the production of an organism's reactions to external stimuli. Also, according to the theory of neurobiotaxis formulated by C. U. Ariëns Kappers, the presence of ratios of excitation in the nervous system influences its development. The co-ordination of all this work is a problem demanding further research and far more knowledge than is at present available concerning nervous function, particularly of the cerebral cortex. Recent neurological work has gone beyond the stage of regarding man as a reflex automaton of *fixed* nervous paths, working *only* through a series of impulses conducted along those paths. It has been shown that conduction of impulses is not the only process that occurs in the central nervous system. The main problems now awaiting solution include what modifications nerve-cells impose on nerve impulses, what is the nature of excitation and of inhibition in nerve-centres, and what are the forms taken by central states of excitation and central states of inhibition in their summation. Pavlov has indicated the *general* movement of states of cortical excitation and inhibition—their constant irradiation and concentration around various focal points of the cortex. We have now to discover something of the nature of those states, and the particular kinds of movement that they take. This may make possible some degree of definition of dynamic spatiotemporal relations in the nervous system, in far greater detail than can be made at present. It is not beyond the bounds of possibility that these dynamic inner relations of the nervous system will be found to correspond with the relations of the ever changing environment to which the organism reacts.

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[9] LASHLEY, K. S., *Brain Mechanism and Intelligence*, 1929, p. 160.
[10] Idem, pp. 160, 161.
[11] PAVLOV, *Lectures on Conditioned Reflexes*, p. 221.
[12] SHERRINGTON, C. S., *Proc. Roy. Soc.*, 1929-1930, Series B, p. 361.
[13] FULTON, J. F. and SHERRINGTON, C. S., *Animal Biology and Racial Welfare*, 1930, p. 248.
[14] ADRIAN, E. D., *The Basis of Sensation*, 1928. p. 114.
[15] Idem, p. 21.

# Editorial.

## INTERNATIONAL NEUROLOGICAL CONGRESS, BERNE.

AT the beginning of September, for the better part of a week, an International Neurological Congress will convene in Berne. The initial move in the matter came from the American Neurological Association, and the response from all the countries of the world in which neurologists and neurological societies are to be found has proved highly gratifying. So much is this the case that it has been decided to hold simultaneous sessions of the Congress in the afternoons in order to provide opportunities for all, or nearly all, the contributors to offer their papers to their confreres. Set discussions, in which numerous prominent neurologists have agreed to take part, will occupy the morning meetings. By common consent the subjects to be dealt with throughout belong strictly to neurology as understood by those who profess it, and neuro-surgical questions will also engage attention.

This is the first conference of its kind to take place since the War. Before that period similar neurological congresses had met on a few occasions, at intervals of several years—one, indeed, had been arranged for 1914. The fact that representative neurologists, whatever the relation of their respective countries to each other during the world conflict, are now meeting again for purposes of mutual edification and instruction must of itself bear promise of future gain to international comity. Nothing so far has been heard, we believe, of resumption of the series of international medical conferences which were a regularly recurring feature of pre-War medical life and which had been conducted with outstanding success, the last having been held in London in 1913. It may be hoped, however, that these will in due course come again into being. Each year, commencing not long after the close of the period of warfare, an interallied neurological congress has met in Paris, at the instigation of the Société de Neurologie, and on the last two or three occasions its title has been altered to the extent of substituting ' international ' for ' interallied.' At these, it has been eminently

pleasing to find delegates from formerly opposed belligerent nations taking part amicably in the furtherance of neurological interests and knowledge. Evidently, then, the time was ripe for the step in advance now formally taken, from which nothing but mutual benefit should ensue.

Aside, however, from the purely scientific aspect of international gatherings of this kind, equal if not, indeed, greater significance attaches to the opportunity they furnish of meeting men and women in the flesh whose names only may have been known, whose reputations may have been estimated only by output of work ; but actually to see and hear such exponents of neurology is always of peculiar interest and value. It is a curious circumstance that appreciation of an individual's worth can not infrequently be properly gauged only when he is encountered personally ; we all consciously or unconsciously depend for adequate understanding of the merits of scientific attainment to a large extent on what we glean by direct contact with the person concerned. Rightly or wrongly, we often pride ourselves on being able to sum up the value of a man's contributions better after we have seen him and heard him speak. We take to him, or we do not. If we are every now and then reminded that the artist and his work are separate, or separable, that consideration of the one should influence us neither favourably nor unfavourably in respect of the other, it is nevertheless legitimate to believe that his work is but the expression of what the artist has within him and that the two are not in point of fact dissociable. And the remark applies also to the scientific as well as to the world of artistry—perhaps with greater force. The reliability of the data in a scientific study cannot altogether be dissociated from what is learned of the author himself by means such as have been already outlined. To provide these means of intercourse and contact is assuredly one of the best of the raisons d'être for international meetings.

A number of the countries which may be considered to possess the advantages of size and cultural richness have long had recourse to annual conferences of their several neurological societies for the double purpose of pooling knowledge and of fostering the spirit of mutual friendliness and interest. Such conferences have been held by the American Neurological Association without a break for more than half a century, and the Gesellschaft Deutscher Nervenärtze has a record of over twenty years. Since the War, too, similar proceedings have characterised the activities of societies in distant parts, where formerly nothing of the kind was undertaken. Can we

regard the situation in England favourably when its position in the neurological sphere is given a glance ? We have no cause for congratulation, be it fully and promptly admitted. The old Neurological Society of Great Britain, whose identity was merged in the Royal Society of Medicine, was in the habit of promoting an occasional provincial conference over one or two days, but for years none of a comparable kind has been held. Although the latter Society covers the whole field of medicine in its numerous sections, this has not prevented the development of distinct associations the prime feature of whose healthy growth is the conducting of annual meetings in different parts of the country. Without more than an allusion to the annual yearly congress of the British Medical Association, we may enumerate as somewhat more applicable to the point at issue those of the Association of Physicians, of British Surgeons, of Neurological Surgeons, of the Ophthalmological Society—and several more might be mentioned. Then why not an Association of British Neurologists ? Surely there is room and to spare for the formation of such a group. The alternative would be for an annual meeting of the Neurological Section of the Royal Society of Medicine to take place outside London, but for several reasons which it is not here necessary to specify the former suggestion is clearly preferable. At any rate, England lags behind other nations if she does not possess a neurological body, representative of town and country, whose existence would have as its main justification the promotion of mutual neurological interest by a yearly meeting of a day or two, at which both scientific and social aspects would be borne in mind, and from which we firmly believe an ever renewed incentive to fan the flame of neurological knowledge would spring.

# Abstracts.

## Neurology.

### NEURO-ANATOMY AND NEUROPHYSIOLOGY.

[1] **Contribution to the knowledge of the fine structure of the region of the substantia nigra** (Contributo alla conoscenza della fine struttura della regione della substantia nigra).—M. Emma. *Riv. di pat. nerv. e ment.*, 1929, xxxiv, 579.

The author pays particular attention to the positions of the nucleus in the dark cell area, to the relationship between the pigmented Nissl's granules and the neurofibrillary network, and to the extension and distribution of the latter amongst the dark cells. He has tried to define the behaviour of the black pigment to reactions for fat and its relationship to the latter substance, more particularly in the absence of lesions of the region and independently of the rest of the nervous system.

The research has been carried out in cases which if not entirely normal have had no lesion of the nervous system and particularly none of the extrapyramidal nervous system.

R. G. G.

[2] **Certain characteristics of the cortical influence over the sympathetic nervous system in man.**—R. M. Brickner. *Jour. Nerv. Ment. Dis.*, 1930, lxxi, 689.

Two patients with hemiplegia are described in whom the experiencing of an emotion produces exaggerated pilomotor phenomena on the hemiplegic side. The simple pilomotor reflex in the same zone is normal. The behaviour of the pilomotor system in these two cases is contrasted with that in one of partial section of the spinal cord, in which, while the simple reflex is exaggerated, there are no abnormal phenomena in response to an emotional stimulus.

The human cortex is probably the site of the origin of a neurone which exercises a definite influence over, and is a part of, the sympathetic nervous system. The neurone (I) probably terminates in the hypothalamus and in parts of the thalamus, from which the second one (II) descends to the intraspinal cells of the first peripheral sympathetic neurone. In the hemiplegic

cases there is interruption of neurone 1, and in the spinal cord case, of neurone 11. Both neurones 1 and 11 are probably anatomically associated with the pyramidal tract and may decussate with it.

The release phenomenon is a general principle, and applies to the sympathetic as well as to the other parts of the nervous system. When neurone 1 is interrupted, hyperfunction of neurone 11 is exhibited upon stimulation; destruction of neurone 11 causes exaggeration of the activity of the peripheral sympathetic neurones.

Because of their arrangement the sympathetic tracts are suitable for a study of certain properties of the phenomenon of inhibition, which leads to the following conclusions:

1. The ability of any neurone to inhibit is an inherent part of the function of that particular neurone, independent of the activities of neurones situated higher up.

2. The inhibitory power is not of such a nature as to be transmissible from one neurone to another.

R. G. G.

## NEUROPATHOLOGY.

[3] **Gangliogliomas.**—C. B. Courville. *Arch. of Neurol. and Psychiat.*, 1931, xxv, 309.

The author reviews the problem of the nerve-cell-containing gliomas, and reports a tumour of this type in the right temporal lobe. It fulfilled the essential characteristics of the group, but differed from some in its greater cellularity, the small amount of stroma, and the presence of mitotic figures. The characteristics of gangliogliomas of the temporal lobe are presented, together with a table of the cases reported. They are similar in many respects, if not identical with, the 'spongioblastoma unipolare' described by Bailey and Cushing. The suggestion is made that the pronounced mental phenomena which are present in the clinical picture in most of these cases, as well as their fatal issue in the absence of local serious damage, are the result of a toxic product elaborated by the tumours. R. M. S.

[4] **Origin and development of giant-cells in gliomas.**—B. J. Alpers. *Arch. of Neurol. and Psychiat.*, 1931, xxv, 281.

In a well illustrated paper the author calls attention to the preponderance of giant-cells in some types of glioma. A spongioblastoma multiforme with numerous giant-cells is described, and their presence in other gliomas is discussed.

In summary, one may consider the formation of multiple nuclei as a phenomenon of amitosis, which is frequently frustrated before total separation of the nuclei and division of the protoplasm take place.

R. M. S.

[5] **On the structure and histogenesis of cerebral gummata** (Sulla struttura ed istogenesi della gomma cerebrale).—G. ZANETTI. *Riv. di pat. nerv. e ment.*, 1929, xxxiv, 299.

CEREBRAL gummata may occur under two forms—nodular and infiltrating. The two different aspects of the granulomata are ascribed to the particular way in which the process evolves. This remains more or less typical according to the reaction of the fibrous neuroglia and the resulting necrosis.

The nodular form presents characteristic phenomena of proliferation of vascular and neuroglial tissue with exudation and regression of the elements which compose it. This is especially met with after proliferation has taken place. In these gummata there is little endarteritis obliterans ; reparation phenomena difficult to follow in any given case accompany the process.

In the sclerotic gummata there is a red softening and the gliosis is specially perivascular and is associated with the phenomenon of angioplasia. Necrosis in these gummata is very distinct. R. G. G.

[6] **On a case of primary degeneration of the corpus callosum of the type described by Marchiafava** (Su un caso di degenerazione primaria del corpo calloso tipo Marchiafava).—F. GUCCIONE. *Riv. di pat. nerv. e ment.*, 1929, xxxiv, 722.

THE lesions in this case of a man, 82 years old, affected, in addition to the whole corpus callosum, symmetrical areas in the white matter of some convolutions —the foot of the first frontal, the upper portion of the ascending frontal, and strands of the superior parieto-occipital bundle. Although the patient was a heavy (wine) drinker there were no lesions in the liver. Death was from bronchopneumonia without many symptoms—a frequent cause of death among dements.

The glial elements were proliferated in proportion to the degenerated neurones, but this state of affairs is not described by all authors. There was some new formation of vessels ; and amyloid bodies in the degenerating but not in the most degenerated areas pointed to the progressive nature of the lesion. Granular cells containing blood pigment suggested the presence of small hæmorrhagic areas in the course of degeneration.

There were not sufficient data to warrant discussion of the pathogenesis.
R. G. G.

[7] **The question of 'end-arteries' of the brain and the mechanism of infarction.**—STANLEY COBB. *Arch. of Neurol. and Psychiat.*, 1931, xxv, 273.

COBB's observations lead him to believe that there are no end-arteries in the brain, not even in the basal ganglia. If one considers any artery, which has

no obvious anastomosis of branches large enough to be called truly arterial, to be an 'end-artery,' one may find many such in the kidney, spleen, mesentery and retina, and a few in the brain. Functionally speaking, however, the capillary and arteriolar anastomoses keep the arterial tree from acting as the sole blood supply of any part.

Œdema is probably the most effective factor in shutting off blood from anastomosing capillaries and other small vessels, for these have a low blood pressure, and the swelling quickly blocks the flow, as in wheal formation in the skin. Thus, in the brain, occlusion of an artery, in spite of arterial and capillary anastomosis, can cause enough reduction of oxygen supply to produce necrosis. It is a matter of relative anoxæmia (not of anatomically perfect anæmia) in a tissue more dependent on its oxygen supply than any other tissue in the body.

R. M. S.

[8] **Intracellular parasitic appearances in disseminated sclerosis** (Figures parasitaires intra-cellulaires dans la sclérose en plaques).—P. GUIRAUD. *L'Encéphale*, 1931, xxvi, 349.

THE case of disseminated sclerosis in which the intracellular inclusions to be described were found was one in which the first symptoms in 1921 were those of an acute confusional state. This recurred in 1929 and was then associated with objective nervous manifestations, viz. intention tremor and ataxic gait. A fresh attack occurred in June 1930 which began with left hemiplegia and progressed with symptoms of myelitis to death in August 1930. Histological examination of the central nervous system revealed an enormous number of plaques chiefly of recent formation. They were characterised by the presence of numerous large neuroglial cells with swollen bodies, a few short processes, and often with hypertrophied or multiple nuclei. In many of these cells there were found cytoplasmic inclusions which were best demonstrated by Wolbach's technique, or by Mann's methyl blue eosin stain. They usually lay toward the periphery of the cell body, from one to five being seen in one cell. Three main types were distinguished but there were many intermediate forms. The first type consisted of a small oval homogeneous mass, one or two micra in size, staining by nuclear dyes. The second resembled a dumbbell or punt, in that the colourable material was concentrated at the poles with a faintly staining central portion. The third type was spindle-shaped, with thread-like extremities which stained deeply. In this form a sharply defined, darkly staining mass which took the eosin with Mann's method was constantly found. Owing to the constancy of their size, the regularity of their form, the constant repetition of the same forms, the complexity of their structure, the presence of nuclein in them, and their staining reactions, the author considers these inclusions to be of parasitic nature. He considers them to be identical with the 'spirochætal debris' of Steiner and the inclusions seen by Luthy.

J. G. G.

[9] **The Marchi method.**—DONALD DUNCAN. *Arch. of Neurol. and Psychiat.*, 1931, xxv, 327.

FROM a study of nerves removed from the human subject and various animals the author shows that in any series of Marchi preparations the normal fibres always contain some black globules (Elzholz bodies) and irregular areas. Their size and number vary with the fixing fluid used, the strength of the osmic acid, and the time the tissue is exposed to its action.

A useful bibliography is appended.

R. M. S.

[10] **The influence of spinal puncture on the vegetative nervous system** (Influenza della rachicentesi sul sistema nervoso della vita vegetativa). —A. LEANZA. *Riv. di pat. nerv. e ment.*, 1930, xxxv, 244.

THE author has examined the function of the vegetative nervous system in 50 individuals before and after spinal puncture, and has found in about half the cases a disturbance of the vegetative nervous system characterised by hypo-excitability of the sympathetic and hyper-excitability of the autonomic system. He thinks this is due to a diminution of a reflex which stimulates the sympathetic and originates from the pressure of the fluid on the walls of the cavity in which it is contained.

R. G. G.

[11] **The glucose tolerance curve in epilepsy.**—G. W. J. MACKAY and H. BARBASH. *Jour. of Ment. Sci.*, 1931, lxxvii, 83.

WHILE there is no typical glucose tolerance curve in epilepsy, a high percentage of epileptic patients present a glucose tolerance curve of a definitely subnormal type. The writers have attempted to correlate the type of epileptic (e.g., irritable, confused, demented) with the blood sugar level, but have been unable to determine that there is any such relation. Similarly they have been unable to establish any definite relation between frequency of fits and the blood sugar level. The comparatively high percentage of cases with renal glycosuria in their series is worthy of note.

C. S. R.

## SENSORIMOTOR NEUROLOGY.

[12] **Encephalitis periaxialis diffusa: Schilder-Foix disease** (Encéphalite periaxiale diffuse: Maladie de Schilder-Foix).—L. COENEN and LEON MIR. *L'Encéphale*, 1931, xxvi, 357.

THE authors describe a case of Schilder's disease in a man of 41 which began with loss of sight in the left eye. Headache, stiffness of the right arm, a burning sensation round the abdomen, and deafness of the left ear came on soon after,

and within three weeks his right leg and left arm became weak and sensation was completely lost on the left half of the body. Both optic discs were swollen and pale. The patient died 43 days after the onset of the disease. Post mortem diffuse sclerosis and demyelination of the white matter of the cerebral hemispheres were found, with more discrete patches in the pons and cerebellum. The cortex was everywhere spared. In the histological examination the most noteworthy finding was the large number of ' mucocytes ' in the areas of more recent demyelination. The authors confirm the findings of Grynfeltt and Pelissier and of Bailey and Schaltenbrand that mucocytes arise from ' acute swelling of the oligodendroglia ' by imbibition of the early products of myelin disintegration (protagonoid substances). They consider that in Schilder's encephalitis the disease process attacks first the oligodendroglia, and that the degeneration of myelin is secondary to this. Otherwise the authors do not contribute anything fresh to our knowledge of this disease. It is unfortunate that the optic nerves do not appear to have been examined.

J. G. G.

[13] **Schilder's encephalitis periaxialis diffusa.**—M. M. CANAVAN. *Arch. of Neurol. and Psychiat.*, 1931, xxv, 299.

A MALE child, seen repeatedly from the age of ten weeks to sixteen months, died at sixteen and a half months of age. Only at ten weeks and during the last two weeks of life did he present evidence of infection. A tentative diagnosis of hydrocephalus was not substantiated by post-mortem examination, there being no distension of the ventricles, although the brain was larger than normal and weighed 1,890 grm. after three days in formaldehyde.

Sections through the substance of the brain showed *a* subcortical loss of myelin and a diffuse and marked œdema of the white matter, with no vascular inflammatory reaction. The Purkinje cells, as well as cells in the cerebral cortex, were preserved.

R. M. S.

[14] **A general symptom in brain tumour** (Ein Allgemeinsymptom bei Hirntumoren).—WILHELM KLIMKE. *Münch. med. Woch.*, 1931, lxxviii, 50.

FOUR cases of cerebral tumour are recorded in which Kehrer's two signs were demonstrable in unmistakeable fashion. The first of these comprises the production of pain on deep pressure over the back of the neck a little to one side of the mid-line, at the site of emergence of the great occipital nerve. Associated pain-reactions consist in flushing of the face, and flexion of the head and neck backwards and to the homolateral side. Kehrer's other sign consists of pain on deep pressure over the points of emergence of the three branches of the

trigeminal nerve on the face. While this manœuvre may cause pain on one side only or perhaps merely in one or two of the branches in cases of tic douloureux and of migraine, in patients with cerebral tumour all six points are painful on pressure. The author believes that these are early and valuable signs of increased intracranial tension analogous to the demonstration of papillœdema. Further research is required to determine which of the two signs can be elicited first and whether there is any correlation between priority of appearance and site of the neoplasm.

M. C.

[15] **A case of Davidenkoff's 'hormetonia' after an extravasation into the cerebral ventricles.**—T. Dosuzkov. *Jour. Nerv. Ment. Dis.*, 1930, lxxi, 735.

In a case of severe hæmorrhage into the ventricles there occurred a series of attacks or fits of muscular rigidity ('hormetonia'). The author compares these to the phenomena of decerebrate rigidity and thinks they may represent defect of mesencephalic as well as of cortical control.

R. G. G.

[16] **A plaque of tuberculous meningitis in the region of the tuber cinereum, with the syndrome of the tuber cinereum** (Plaque de méningite tuberculeuse de la région tubérienne, agitation catatonique, syndrome infundibulo-tubérien, pseudoparaplégie en flexion).—M. Dide and H. Denjean. *L'Encéphale*, 1931, xxvi, 181.

The case described presented the syndrome which Dide in 1928 associated with lesions of the tuber cinereum. The patient had always been neurotic and impulsive. From January to June 1925, at the age of 16 years, he was ailing with gastric pain, constipation, vomiting, headache and rapid wasting. Along with these symptoms several attacks of an acute anxiety state came on. After about six months he recovered and remained perfectly well for nearly two years. In June 1927, after an attack of congestion of the lungs his previous symptoms returned with four attacks of anxiety neurosis each of which lasted from 10 to 12 days. Thereafter in January 1928 he became acutely maniacal, constantly on the move, muttering a few words or signing a few snatches of song, but apparently taking no interest in his surroundings. At this time it was found that he was passing from $1\frac{1}{2}$ to $2\frac{1}{2}$ litres of urine a day. He also showed a slight internal strabismus. The cerebrospinal fluid examined about this time was normal except for an excess of pressure and a reduction of the chlorides to 0·55 per cent. His condition remained much the same till the end of April when it was noted that he walked with short steps, with his knees bent, and in bed also his knees tended to be flexed. The cerebrospinal fluid examined at this time was again normal except for a rather greater rise in pressure and a fall of the chlorides to 0·5 per cent. From this time, till his death

on June 18, the flexure of the legs increased but there was no alteration in the reflexes. He continued to pass large quantities of water and to waste rapidly though his appetite was large. He died in coma.

The autopsy showed a small tuberculous focus at the apex of the right lung but no other evidence of tuberculosis except in the brain. Here a gelatinous mass of tuberculous exudate filled the cisterna basalis, passing out from it to the neighbouring meninges for some distance. Microscopically it was found to contain giant-celled tubercle nodules, in which tubercle bacilli could be demonstrated. The nerve-cells in the neighbourhood showed degenerative and chromatolytic changes. The exact distribution of these changes is not stated but it was noted that the nucleus proprius of the tuber cinereum was among the most affected. The authors consider that this tuberculous lesion in the region of the tuber cinereum had existed for three years. The first attack of headache and vomiting in 1925 signalised its onset, and from January to June of that year the lesion was active. Then followed a period nearly two years long of apparent recovery, followed by a relapse and gradual progress of the disease till death a year later. The case is of interest on the pathological side as being an unusually chronic type of tuberculous meningitis, and on its clinical side as providing a clear-cut instance of an unusual and bizarre syndrome.

J. G. G.

[17] **The diagnosis of choreiform dyskinesia** (Zur Diagnose der choreatischen Dyskinesie).—M. I. Jogichess. *Münch. med. Woch.*, 1930, lxxvii, 2137.

Although the diagnosis of chorea is in the majority of instances extremely easy, nevertheless difficulty may appear both in the early stages when the movements are under some degree of control and also in the late phases. Confusion with tics as well as with the fidgety movements of the restless child are not rare. The demonstration of signs other than the characteristic movements is of great assistance. The author details several of the better known of these ' minor signs ' of chorea, such as hypotonus, the sustained knee-jerk of Gordon, the characteristic tongue sign of Sachs, and the uneven hand-grasp sign of Filatow. For proof of hypotonus the child should be watched, without its knowledge, during the performance of some such manipulation as the picking up of a small fragment of paper and putting it down in another place. Jogichess has added his so-called isokinetic test to these minor signs ; doctor and patient stand facing each other with their hands and arms outstretched at the same level. The examiner then alternately raises and lowers his arms slowly and evenly, and the patient is told to copy this manœuvre exactly, and at precisely the same time. A normal individual finds no difficulty in this, but the choreic child raises and lowers his arms irregularly, now too fast, now too slowly. The more deliberate and slow the examiner's movements, the greater is the patient's difficulty.

M. C.

[18] **A very rare type of alternating paralysis** (Rarissimo tipo di paralisi alterna inferiore).—U. DE GIACOMO. *Riv. di pat. nerv. e ment.*, 1930, XXXV, 1.

THE author describes a case of hemiplegia with involvement of the lower branch of the facial of the same side, supranuclear in type, associated with a paralysis of the sixth nerve of the opposite side. This was proved to be due to a small vascular lesion. The findings show that the corticofacial fibres cross at the caudal end of the pons. Other types of alternating paralysis are discussed.

R. G. G.

[19] **Contribution to the differential diagnosis of epileptic disorders** (Kasuistischer Beitrag zur Differential diagnose epileptischer Störungen).—HANS BAUM. *Münch. med. Woch.*, 1931, lxxviii, 25.

THE symptoms in the following patient had been regarded for years as due to an idiopathic epilepsy, despite the late age of onset of attacks. The mildness of the original head injury and the symptomless interval of two years allowed the traumatic basis to be overlooked.

A healthy man of 38, while serving during the war in the Landwehr, was admitted to hospital in November, 1914, on account of head wounds from a hand-grenade. Minor injuries of the right cheek and lower jaw were present and the patient was discharged by Christmas. He returned to the line where he remained perfectly well until July 1917, when he suffered from an epileptic fit. He remained under medical observation at various hospitals during the next eight months, and was finally discharged from the army in March 1918, with a pension of 33⅓ per cent. Epileptic attacks of a mild character continued, at intervals varying from one and a half to four weeks, being more frequent when he worked hard. As he had injured himself on many occasions, he found difficulty in obtaining employment and in August 1930 he sought an increase in the amount of his pension. He was accordingly admitted to hospital, where no neurological abnormality was detected. His mentality was characterized by dullness, slowness of cerebration, inattention and irritability. One or two insignificant scars were apparent over the cheek and right side of the head. An X-ray revealed a large number of small, irregular metallic splinters embedded in the soft tissues of the right side of the face and in the right hemisphere. A number lay in the region of the scalp wound, and two larger fragments were visible in the depths of the right parieto-occipital lobes.

M. C.

[20] **A severe case of lightning-shock with favourable outcome** (Ein schwerer Fall von Blitzschlag mit Ausgang in Heilung).—HANS DENGL. *Münch. med. Woch.*, 1931, lxxviii, 27.

WHILST working in a field during a storm, a woman was struck to the ground unconscious by a lightning flash. Her clothes were badly torn. On admission to hospital she was still comatose and could not be roused even by painful stimuli. Her heart sounds were feeble and the pulse rate measured 180 per min. Blood pressure was 90/40. Respirations were slow and shallow, and frequent yawning took place. A catheter specimen of urine contained no abnormality. Examination of the nervous system revealed nothing noteworthy other than an exaggeration of the knee and ankle jerks and a marked universal dermographism. Extensive burns were present; at the back of the head the hair was singed over an area the size of a plate. The point of impact was revealed by a small wound—the size of a pfennig—on the vertex. A band of burnt skin, measuring in width 25-30 cm., extended from the occiput down the back to the sacral region and thence to the backs of the thighs. Over the front of the chest, three tracks reached from the neck to the symphysis and then to the front and inner side of the right thigh. In some places the burns over the back were of the third degree. A recent tear was present across both ear drums. The patient was treated for a time with artificial respiration, and after repeated injections of 'Kardiaka' respiration and heart action returned to normal. Consciousness gradually returned after 48 hours but a retrograde amnesia persisted. She complained of intense pain in the region of the burns and also of a generalized sensation of coldness. These symptoms were relieved by warm applications and by sedatives. On the sixth day, on account of headache, a lumbar puncture was performed; the spinal fluid contained a slight excess of globulin. By the seventh day the patient was quite clear in her mind and correctly orientated; she got up on the fourteenth day and left hospital a week later. There were no abnormal physical signs in the nervous system at the time of her discharge.

M. C.

[21] **Deafness in trichinosis** (Taubheit bei Trichinose).—HANS BOSCH. *Münch. med. Woch.*, 1931, lxxviii, 436.

A FEMALE aged 51 was admitted to hospital with a trichina infection, 23 days after the ingestion of ham from bears. Her symptoms comprised drowsiness, pains in the muscles and stiffness; blood examinations revealed an eosinophilia and demonstrated the trichinæ. Two weeks after eating the bear-flesh, she first noticed deafness. Ten days after admission she was totally deaf; air and bone conduction were both lost; it was impossible to carry out the Weber or Schwabach tests. No abnormality could be detected in the ear passages or tympanum; the nose and throat were also healthy. A complete otological

examination was carried out every three days, and a slow improvement became evident. After she had been in hospital about a month, she was able to understand vowels and syllables shouted directly into the ear.

The author regards the deafness as due to a toxic acoustic neuritis rather than to a direct implication of the eighth nerve by the trichinæ.

M. C.

[22] **Meralgia paraesthetica.**—S. BERGSMA. *Jour. Nerv. Ment. Dis.*, 1930, lxxi, 718.

A CASE of this condition is fully described ; it consists of painful paræsthesiæ in the area supplied by the external femoral cutaneous nerve. Since the affection is chronic and may recur even after the divided nerve has regenerated, the author advises section of the nerve above Poupart's ligament and avulsion of the distal end by a technique which he describes.

R. G. G.

### PROGNOSIS AND TREATMENT.

[23] **Curable forms of purulent meningitis of traumatic origin** (Sur les formes curables de la méningite purulente d'origin traumatique).—L. E. BREGMAN and G. KRUKOWSKI. *L'Encéphale*, 1931, xxvi, 110.

MENINGITIS is one of the most fatal complications of fracture of the skull. Nevertheless the authors are able to bring forward three cases which recovered. In the first case coliform bacilli were found in the cerebrospinal fluid ; in the second case hæmolytic streptococci, while in the third the fluid, although purulent, remained sterile. In the first and third cases a fixation abscess produced by an injection of turpentine appeared to have a beneficial effect.

J. G. G.

## Psychopathology.

### NEUROSES AND PSYCHONEUROSES.

[24] **The incidence and significance of fingernail biting in children.**—DAVID WECHSLER. *Psychoanalytic Review*, 1931, xviii, 201.

THIS study was of 3,000 children of both sexes, ranging from one to seventeen years of age. An examination of the data showed that fingernail biting under the age of three does not occur. The tendency first begins to manifest itself during the fourth year, rises slightly in the next, and then suddenly jumps up at age six, from which year it maintains a fairly constant level until puberty. At age twelve for girls and age fourteen for boys the percentage once more

rises and continues at a high peak for two years. It then quickly recedes to a very low level at which it continues for the entire adult period.

It becomes apparent that there is some connexion between the incidence of fingernail biting and various periods of psychosexual development. The beginning of nail-biting activity may be expected with gradual increase from the age of three to five. This represents a start at vicarious attempts at genital and onanistic activity. At this age the child is confronted with the Œdipus situation on the one hand and parental prohibitions in regard to manifestations of genital activity as well. The rise at six can be accounted for if we accept fingernail biting as a vicarious onanistic activity. It is an indication of the fact that transition from genital activity to latency is in a large percentage of cases unsucessful. Fingernail biting in that it affords an outlet for libidinal gratification is accordingly seized upon, and its presence here as at later periods is an indication of the persistence of an unresolved Œdipus situation.

The rise occurs again at puberty when it is expected according to psychoanalytic theory. At this time the Œdipus situation is revived, and the guilt feelings of the infantile sexual period reactivated, prior to its final disposition with the acquisition of adult sexuality. With this disposition a rapid fall in the incidence of fingernail biting is to be expected and that is what is actually observed.

In view of the large percentage of children who bite their nails (between ages of six and sixteen, in the vicinity of 30 per cent.), certainly in its milder form, the habit cannot be looked upon as pathological. Really it is not a habit but a symptom, a symptom of the persistence of the unresolved Œdipus situation. All efforts at reducing it, based on the psychology of habit-formation, are considered by the writer doomed to failure. The only way to treat nail-biting, as in the case of any other condition, is to attack the cause and not the symptom itself.

C. S. R.

[25] **A qualitative study of behaviour problems in relation to family constellation.**—John Levy. *Amer. Jour. Psychiat.*, 1931, x, 637.

In a clinical survey of the population of Chicago the distribution of children's behaviour problems appears to be for the most part independent of size of family. In a small rich community, families in which there is only one child may produce problem children more frequently than other size family groups, but this finding is true only of boys; girls do not appear to be often recognized as problems in such districts. In a large city boys come to the attention of the psychiatrist more than twice as often as girls; and the first-born child is a problem child relatively more frequently than children in any other ordinal position. This holds after allowance has been made for the fact that there are

more first-born children in the community. The second-born child is a behaviour deviate relatively more frequently than children in other ordinal positions only when a small high grade community is studied. The sex of the sibling nearest in age to the problem child may have a bearing upon the incidence of these problem children. The only child does not appear to be a spoiled child as frequently as children from two-children families—if one accepts personality and emotional difficulties as the outward manifestations of a spoiled child. Only children are troubled more by scholastic difficulties than children with brothers and sisters. The only child commits more acts of delinquency than children with one brother or sister. But most delinquents appear in very large families where economic and social conditions are more important than family inter-relationships.

C. S. R.

## PSYCHOSES.

[26] **The thyroid factor in dementia præcox.**—R. G. Hoskins and Francis H. Sleeper. *Amer. Jour. of Psychiat.*, 1930, x, 411.

Among 130 subjects of dementia præcox a group of 18 was diagnosed as suffering from thyroid deficiency. Of these 16 received thyroid treatment. Significant mental improvement followed in 14 or 88 per cent. of the cases and five became well enough to go home. In the control group of 41 patients receiving similar treatment the incidence of significant improvement was 34 per cent. There was probably some degree of thyroid deficiency in various subjects of the control group, since 31 were recorded as showing 'endocrine deficiency unclassified.' A considerable number of the control subjects received other than thyroid medication which probably contributed to the improvement shown. In general, cases presenting a favourable initial prognosis were excluded from treatment. The results of the study are interpreted as indicated that thyroid deficiency plays a significant role in more than ten per cent. of state hospital cases of dementia præcox and that in properly selected cases thyroid medication in adequate dosage and for a sufficiently prolonged period results in significant improvement. On the other hand, relatively little success is to be anticipated from thyroid medication in cases selected at random.

C. S. R.

[27] **Unconditioned and conditioned reactions to pain in schizophrenia.**—Lauretta Bender and Paul Sch lder. *Amer. Jour. of Psychiat.*, 1930, x, 365.

The reaction to pain in catatonics is usually said to be awkward, incomplete or absent. A series of sixteen cases were experimented with by the use of a simple electrical apparatus to see if it would be possible to build up a condi-

tioned reflex towards pain in stuporous conditions. It was generally found that the reaction is often retarded and incomplete, is influenced by the quality and strength of the stimulus, and may be limited to a tonic 'squirming' one. The squirming is usually local, at the most spreading only to the next joint. The phenomena of arching of the hand, spider position of the fingers, and rebound of isolated hand or fingers, and increased athetoid movements of fingers were outstanding types of reactions. The reaction may be an expressive stiffness of the whole body, and emotional reactions and changes in breathing may be present. Effective pushing back or escape did not occur in cases with marked motor phenomena. The complete or incomplete return to the disagreeable stimulus was a common feature. The most striking feature was that the defence of the individual no longer seemed to be integrated. Disintegration in the pain reactions was also evident in that the individual part acted in an isolated way and there was less of a reaction of defence than an expression of attitude. The resemblance between the reactions to pain noted in some gross brain lesions and those in catatonics seems more than superficial. It may be that the dissociation in the organic cases is less changeable but there is enough in common in the two types to justify the opinion that also in the catatonic cases the dissociation is in connection with a change in the function in the brain. The clinical facts do not allow any conclusion whether this changed brain function only results from the general psychic attitude which tends to decentralized actions and to the loss of interest in an action of a rightly integrated and differentiated structure, or whether there are primary changes which coalesce with the changes coming from this general attitude. Pain is an important factor in all life situations. Change in the attitude towards pain indicates either a deep change in the general psychic response or in the apparatus which serves in the integration of attitudes to the life situation.

C. S. R.

[28] **The reactive manic episode: its implications and scope.**—W. McC. Harrowes. *Jour. of Ment. Sci.*, 1931, lxxvii, 127.

The existence of reactive manias is denied by some authorities. Etiology is discussed, and two cases are quoted in which excitement with manic features and toxic phenomena (indicating a reaction of the whole personality) appeared as a result of definite situational difficulties, the proof of this lying in the thought-content of the patient during the more acute stages of the illness. The importance of the formulations which have been made here lies more especially in ability to give a more definite prognosis in cases of this really common type. It is of paramount importance that if the content of thought has a close connection with the total series of events in the illness, then a careful evaluation of these will assist in deciding whether a condition of a long-term or a short-time nature is being dealt with.

C. S. R.

[29] **Manic-depressive psychosis: the relation of hereditary factors to the clinical course.**—H. A. PASKIND. *Arch. of Neur. and Psychiat.*, 1931, xxv, 145.

THE family histories of 633 cases in private practice were examined. In cases whose family was free from neuropathic taint the onset was late (median, 33 years of age); the median for the length of attacks was four months and for the length of the intervals seven years. In cases with both parents neuropathic, the median of the age at onset was 22 years, of the length of the attacks five months, and of the intervals four years. Cases with migraine in one parent showed a median of 29 years of age at onset and of three years for the length of the intervals. A median of five years for the length of the intervals was found for cases with a psychosis in one parent, whereas cases with a neuropathy in a parent and a grandparent showed a median of 26 years of age for the onset. Although the conclusions refer to 485 cases, the table refers to 633.

It is unfortunate that the median has been used and that the author has omitted the actual figures and the means.

G. DE M. R.

## PSYCHOPATHOLOGY.

[30] **The significance of cholesterol in cellular oxidation and its bearing on mental disorder.**—B. H. SHAW and J. S. SHARPE. *Jour. of Ment. Sci.*, 1931, lxxvii, 53.

THE following facts are demonstrated: (1) The inhibitory influence of cholesterol on hæmolysis and its activation by lecithin, also the presence of a thermolabile ferment in serum which activates hæmolysis, and which appears to vary directly with the blood cholesterol content. (2) The influence of cholesterol as a controlling factor in oxidative processes, its controlling power being best exercised in relation to lecithin in the ratio to that substance normally existing in the blood. (3) Lecithin has an attractive influence on potassium ions, and the presence of cholesterol in the membrane definitely retards diffusion of potassium. (4) The retarding effect of cholesterol on the anionic movement of colloidal lecithin. (5) Increase of protein diet has no effect in stimulating metabolism in dementia præcox. (6) The blood-cholesterol content in dementia præcox is greatly diminished, while abnormal increase is noted in states of mania. (7) In general paralysis there is great diminution of cholesterol in the brain substance.

C.S.R.

[31] **The organic acids of the cerebrospinal fluid.**—R. H. HURST. *Jour. of Ment. Sci.*, 1931, lxxvii, 119.

LACTIC acid and total organic acids were estimated in cerebrospinal fluid from cases of general paralysis and from non-paretic patients. In a number of fluids from cases of general paralysis the amino-acid content was also determined. The results showed no increase of lactic acid in general paralysis, but a definite increase in total organic acids. It is argued from the nature of the titration curves obtained, and from other evidence, that the results for organic acids include weak basic material unaccounted for by ordinary methods of analysis, and that this is responsible for the increase in the cases of general paralysis.

C. S. R.

[32] **Biochemical changes during emotion** (Contribution à l'étude des modifications biochémiques au cours des émotions).—H. JANKOWSKA. *L'Encéphale*, 1931, xxvi, 204.

THE author examined hyperemotional patients to see what biochemical changes were associated with variations in emotional state. It was found impossible to examine the blood chemistry owing to the constant emotional disturbance caused by the prick of the needle. The urine was therefore examined for hourly quantity, reaction (pH), chloride, nitrogen, ammonia nitrogen and sometimes for calcium. As a general rule it was found that during emotion there was a tendency to alkalinity, expressed as a rise in pH from the normal (5 to 6) to between 6 and 7, or even slightly above this. This was associated with an increase in total nitrogen and in quality, and sometimes also in calcium and ammonia. In a case of permanent anxiety high figures were obtained in each of these examinations throughout the patient's stay in hospital. In two cases of schizophrenia variations in the urine similar to those found during emotion were observed, without the display of any emotion by the patient. Two possible explanations of this were offered : (1) That schizophrenics experienced emotions which they did not betray ; or (2) that the changes in the urine were due to the functional disturbances in the brain which in normal subjects led to the somatic expression of the emotions.

J. G. G.

[33] **Focal sepsis in mental disorder : The 'Pathogen-selective' method of diagnosis.**—ARTHUR POOL. *Jour. of Ment. Sci.*, 1931, lxxvii, 137.

A SERIES of cases of chronic encephalitis, confusional insanity, etc., have been investigated in order to assess the role of chronic sepsis as an etiological factor. The 'pathogen-selective' technique has been employed throughout, and its utility in incriminating or exonerating particular foci of sepsis as causative has been illustrated in three cases. Details of bacteriological results

are set out in a table and they illustrate how by this simple method of using the patient's blood as a facture in culture the causative organisms can be detected. This method, too, adds bacteriological finesse to the preparation of autogenous vaccines, and makes such more selective in their action.

C. S. R.

[34] **Aural sepsis in relation to mental disorder.**—A. McCay and F. H. Healey. *Jour. of Ment. Sci.*, 1931, lxxvii, 193.

Aural sepsis as a factor in the production of psychosis has been given special attention by Graves. He analysed two series of cases of acute mental disorder, and found 31.7 per cent. in the first series and 42.1 per cent. in the second series to have aural sepsis, chronic otitis media occurring most frequently. Auditory hallucinations may be associated with either the healthy or the diseased ear. The writer here records a case of acute confusional insanity seemingly caused by a sepsis focus in the right ear, and he regards the mental recovery as due in great part to the cleaning out of the septic focus and the establishment of good physical health.

C. S. R.

[35] **Mental changes in cardiac disease.**—Alexander George Gibson. *Jour. of Ment. Sci.*, 1930, lxxxvi, 632.

The influence of changes in cardiac action on mentality need not be limited to the effects of cardiac deficiency on the circulation in the brain, to variations in blood-pressure, blood velocity, and the consequent alterations in oxygen and carbon dioxide tension in the cerebral tissues; we must be prepared to accept, if proved, secondary effects from changes in glands and other organs disturbed by the same circulatory changes.

Certain cardiac conditions are thought to be commonly associated with particular mental states. Pericarditis in the young sometimes produces querulousness and neurasthenia. Angina pectoris is occasionally associated with emotionalism and irritability. The cardiac death in diphtheria is peculiar and characteristic. Children who die from cardiac failure in this disease are acutely conscious until the final stupor and may suffer agonies of apprehension and fright. Aortic regurgitation, especially the syphilitic variety, may be associated with impulsive insanity. Carey Coombs finds no support for the view that cardiac disease in itself is responsible for mental disorder, and from his own 2,000 cases found only 10 associated with insanity. The changes in mentality seen in older persons he attributes to the effects of senile changes.

The writer concludes that no explanation from the cardiological point of view can be given why one patient with a serious cardiac lesion is clear in mind while another shows mental symptoms. It is not always possible to postulate cerebral degenerative lesions. The reason more probably lies in the manner in which patients with specific psychological tendencies react to circulatory and other changes. Mitral stenosis and ischæmic necrosis are more likely than other cardiac lesions to produce mental change. Mental symptoms due to faulty cardiac action tend to improve rapidly if the heart can be restored to normal activity.

C. S. R.

[36] **Additional observations on the castration reaction in males.**—Nolan D. C. Lewis. *Psychoanalytic Review*, 1931, xviii, 146.

Suicide and self-castration and their symbolic expressions seem to be connected or associated with or different aspects of the same mechanism and develop in the same setting or background. The surface releasing causes of suicide are often said to be financial, social, or physical difficulties, etc., but in practically every case these are shelter reactions and very superficial ones, as the patient is consciously aware of the more fundamental worry, i.e., the difficulty in the sex life; moreover, he has struggled with this usually for a long period of time before he makes an attack on the ego. In the case of self-castration the attack is made directly against the somatic outpost of the conflict to prevent further conflict and to protect the ideals. In the average case of suicide it would seem that the immediate sexual issue is a failure at the level of heterosexual adjustment, with impotence and a sense of sin and guilt connected with persistent thoughts of the opposite sex in the foreground—in short, the inadequacy reaction; while in the overt castration response the more immediate issues are the masturbation conflict, various homerotic cravings and conflict over homosexual acts, with their incestuous roots implying sin, perversion, ruination and abnormality of personality. In most instances there are long histories of attempts to maintain the ideals of ego in the desires to make good, in alcoholic, philosophic and religious makeshifts. Then as these compensations fail and regression sets in, there are still greater struggles to retain the ideals. Finally just at the point of complete breaking through of the fixation threatening conscious recognition, the attack on the self occurs. The castration complex is here in full force, the incest sin is expiated and the problem destroyed. When the ego survives, as in self-castration, the elements in the conflict become resymbolized and appear at the higher levels of expression.

C. S. R.

## PROGNOSIS AND TREATMENT.

[37] **Investigations into the prolonged treatment of general paralysis with tryparsamide.**—THOMAS TENNENT. *Jour. of Ment. Sci.*, 1931, lxxvii, 86.

FIFTY cases of general paralysis were submitted to treatment by tryparsamide. Seventeen were treated by this drug alone, and in 33 others the drug was combined with fever therapy. Of these, 36 per cent. have had a good remission, 32 per cent. have had a partial remission, 14 per cent. are unimproved and 18 per cent. are dead. The effect of treatment is influenced by the duration of the mental symptoms prior to treatment, by the age of the patient and by the clinical type of the illness. The chances of a successful outcome after treatment diminish in direct ratio to the duration of the mental symptoms prior to treatment. The chances of remission are diminished with the increase of years over 40 years of age. The most favourable types in order of degree of improvement are the manic type, the euphoric type, the simple type and the taboparetic type. The outlook is much better in the simple apathetic type than in the simple 'fatuous' type. The speech defect and the tremors have been the neurological signs which showed the most improvement as the result of treatment. The changes in the reflexes were slight and inconstant, also in the pupillary reactions. In the early stages the clinical and serological changes do not run parallel. Complications resulting from treatment by tryparsamide were very few. This drug is considered as highly valuable in the treatment of general paralysis and the results here obtained were considered encouraging.

C. S. R.

# Reviews and Notices of Books.

**The Primitive Mind and Modern Civilisation.** By CHARLES R. ALDRICH. With introductions by Professor B. MALINOWSKI and Dr. C. G. JUNG. London: Kegan Paul & Co. 1931. Pp. 249. Price 12s. 6d. net.

THE general theme of this thoughtful production, which has evidently owed not a little to Jung's teaching in analytical psychology, is that in primitive epochs, and even yet among primitive peoples, the members of any social group co-operate instinctively by means of an unconscious 'biomorality' (defined as something more than altruism, a mutual helpfulness); a second stage is reached, one of 'savagery,' in which egotistic or individualistic tendencies arise but the exponents thereof are none the less forced to conform to a conventional moral standard or norm; when the third stage, of full individuation, is attained, the persons concerned (though not as yet, we are told, any total society) co-operate with fellow-members of their group consciously for the common good—no longer unconsciously or instinctively—and consciously restrain their egotistic desires in so doing.

The author believes that among certain civilised communities evidence that this third stage has been reached by some is forthcoming; we are assured that 'some of the old, conventional morality is already in the dust-bin, and more will probably follow'; that now 'there is very little danger of disrupting the unity of any society by allowing grown-ups to form any sexual relationships they may desire'; that 'among . . . conventionally moral citizens there are many chaste women whose lives are made miserable by neurosis.' What is not clear, however, is to what extent these several affirmations are based on objective facts or are merely assumptions symptomatic of the post-war times in which we live. Whether 'conventional' moral sanctions have gone, or are going, by the board can in any case apply solely to a limited section of present-day society, and it is well to recall the complete failure of various historical experiments in this respect; one may with equal propriety affirm that in the majority of instances such sanctions still apply. Again, whether in the postulated third stage conscious restraint of personal desires for the sake of others is to become a practical reality, or remain merely a utopian theory, must at present be purely speculative. We should have liked the author to indicate whether in his view advance towards this goal would really constitute progress.

**The Psychology of Men of Genius.** By ERNST KRETSCHMER, professor of psychiatry and neurology in the University of Marburg. Translated, with an introduction, by R. F. CATTELL, Ph.D. London: Kegan Paul & Co. 1931. Pp. 256. Price 15s. net.

THE problems of genius are of perennial interest to the human species. Professor Kretschmer strikes out on a fresh if not precisely novel line of approach to their study by basing his researches on laws—or at least strong probabilities—relating physique to character, and by his careful adjudication, as a professing psychiatrist, on the vexed question of the bearing of insanity on genius, and vice versa. One of his more interesting conclusions is to the effect that while a psychopathic disposition in itself cannot be directly linked to the possession of high talent, genius nevertheless is most apt to spring from a family stock which is beginning to show symptoms of degeneration. Genius is compounded of talent and 'dæmon'; and this 'dæmon' or 'inner voice' derives from a psychopathic element. We believe the author is fundamentally correct in his statement that those who have had chances of observing early and acute stages of certain psychoses with an understanding mind must sometimes have been astonished at 'the inconceivable power, richness and cosmic breadth of the experiences' these individuals occasionally describe, however commonplace their minds; and that 'ecstatic' conditions of this nature show a considerable similarity to the 'inspirations' of genius. Too often is the general discussion of the problem vitiated by the axiomatic assumption, on the part of the normal mind, of superiority over that of the mentally deranged.

The translator points out in his preface how in some ways the essay is coloured by the German outlook, so to speak, of its writer. For example, the latter rules out all women as by a stroke, denying them the possession of genius—the woman genius 'being at heart a man'—and seemingly attaches greater meaning to the genius of the soldier or the creative artist than to that of other human types, which indeed are here to a large extent ignored. When Professor Kretschmer thinks of the few men for whom name and epoch are synonymous there come into his mind 'Cæsar, Luther, Napoleon, Frederick the Great, and Bismarck'—of whom four are militarists and three Germans. What Frederick the Great was going to do in that galley is a question not easy to answer. However, we are grateful for a deeply interesting and illuminating survey of the problem in its diverse aspects.

**Das Stehen.** By Dr. G. G. J. RADEMAKER, professor in the University of Leiden. With 296 illustrations. Berlin: Julius Springer. 1931. Pp. 476. Price RM 69.60.

THIS fine monograph, beautifully printed and illustrated, embodies a long series of physiological researches on muscle tonus, on muscular reactions in standing and maintaining equilibrium, and on the behaviour of these in the

case of animals deprived of their cerebellum. Dr. Rademaker examines at great length, and in ingenious ways, the phenomenon of 'Stütztonus,' by which is to be understood 'support tonus'; its degree is estimated as the maximum of accommodation to the heaviest weight the animal can carry without its paws bending under it. He shows that after extirpation of the cerebellum this variety of tonus at first diminishes, then recovers, till eventually the animal (dog) can actually sustain a greater load, especially when on its back, than the normal dog. When the cerebrum is removed similar reduction in strength of support tonus takes place, yet after 24 hours the latter suffices to bear the weight of the animal's body. The dorsal attitude (animal on its back) exercises an inhibitory influence on support tonus, affecting it materially in the case of the intact animal, little in the case of the animal deprived of its cerebellum, and not at all in the decerebrate preparation. This form of tonus, further, can be modified by the action of labyrinth reflexes, by inclination and turning of the head, by change in position of spine and pelvis, and in other ways. Attention is directed to the occurrence of similar reactions in man, the 'proprioceptive support reactions' of the limbs; these are increased in cases of cerebellar disease, and this accords with the results of animal experiments. An example is the 'forearm sign' of Léri; when the closed fist is passively flexed on the forearm the biceps contracts and the elbow flexes —the reaction is absent in hemiplegia. The author is careful to distinguish the postural and standing reflexes of the *decerebrate* animal from the 'support reactions' of the *normal* animal.

The studies bearing on the problem of the relation of the cerebellum to muscle tonus merit careful perusal. He is sceptical of cerebellar 'ataxia,' of cerebellar 'asthenia'; and altogether so of cerebellar 'atonia.' Dr. Rademaker's work will repay minute examination and is full of value, actual or heuristic, for analysis of human material.

**Diagnosis and Treatment of Brain Tumours.** By ERNEST SACHS, M.D., professor of clinical neurological surgery, Washington University School of Medicine, St. Louis. With 224 illustrations, including ten in colours. London: Henry Kimpton. 1931. Pp. 396. Price 42s. net.

To the comparatively small list of didactic compilations embodying modern advances in nervous surgery and principles of surgical technique related thereto Professor Ernest Sachs has added a handsome volume dealing with the diagnosis and treatment of brain tumours, founded on a wide personal experience and enriched with information culled from various other sources. Introductory chapters on anatomy, physiology, and methods of examination (no doubt excellent for the student but surely otherwise superfluous) are succeeded by a third, on the surgical pathology of cerebral tumours, which follows in the main the terminology of Cushing and Bailey and is well illustrated with photographs

of microscopic sections. General and localising symptomatology engages due attention, as also differential diagnosis. The concluding chapter, on surgical technique, is particularly detailed. A series of illustrative case-histories appear at intervals throughout. From the viewpoint of practice the book makes its appeal primarily to the surgeon, who will, we feel sure, appreciate its many merits, among which a directness and simplicity of description occupy a prominent position.

**Diagnostic des Tumeurs Cérébrales et Épreuve de l'Encéphalographie Artérielle.** By Professor EGAS MONIZ, Lisbon. Preface by Professor J. BABINSKI. With 225 illustrations. Paris; Masson et Cie. 1931. Pp. 512. Price 100 fr.

MORE than one abstract of various papers written during the last few years by Professor Moniz and dealing with the technique which he has devised has appeared in the pages of this JOURNAL. By means of injections of a 25 per cent. solution of sodium iodide (which is more opaque than the bones of the skull) into the carotid and recourse immediately thereafter to X-ray photography, it is possible to have outlined clearly on the plate the course of the main, and indeed of many of the smaller, branches of the cerebral arterial tree. After careful study of the normal distribution and appearance of these vessels, it becomes comparatively simple to ascertain in what way, if any, they are modified by the presence of a cerebral tumour and of accompanying alteration in intracranial pressure.

To this new technique for advancement in knowledge of diagnostic procedures concerned with that subject Professor Moniz has devoted himself with rare persistence, and the result is an impressive monograph dealing seriatim with a large number of tumour cases and with the lessons learned by resort to 'arterial encephalography.' Many of the illustrations are highly instructive, especially those which, in unilateral cases, compare the arterial picture on the normal side with that on the affected.

It is of course apparent that the value of the method will be increased if in other hands than those of its originator similar successful demonstrations are obtained. The volume also contains several general chapters dealing with tumour symptomatology and localisation.

**Le Sommeil.** By Dr. J. LHERMITTE, professeur agrégé, Faculty of Medicine, Paris. Paris: Armand Colin. 1931. Pp. 211. Price fr. 10.50.

IN a delightfully readable fashion Dr. Lhermitte has put together the marrow of present-day doctrine in regard to sleep and its problems, clinical, pathological, and biological. We have been assured that the definition of sleep 'is the calvary of biology,' but within the last few years the strides that have been taken

towards the solution of its inner mystery may fairly be regarded as immense. To this desirable attainment different approaches have been sought, and if that of physiology has seemed the most fruitful, neither the contribution of clinical neurology nor of psychology can be overlooked. With easy mastery of his subject Dr. Lhermitte takes the reader over the field of knowledge, and appears equally at home in all its divisions. The convenient size and the graphic and lucid style of the writer combine in the production of a bibelot which should find its way to the pocket not only of the specialist but of all whose interest these problems awaken.

**La Catatonie Expérimentale par la Bulbocapnine.** By H. DE JONG, Amsterdam, and H. BARUK, Paris. With prefaces by Professor H. CLAUDE, Paris, and Professor B. BROUWER, Amsterdam. Paris; Masson et Cie. 1931. Pp. 136. Price 40 fr.

THE experimental production in animals of a state of catatonia in all its salient features identical with that of the catatonic psychotic patient must be allowed to offer rich promise of further advances into the mechanism of production of psychotic symptoms. For the purposes of this study the authors have used the alkaloid bulbocapnine obtained from *corydalis cava* and numerous details are furnished not only of the general fact but also of the close relation which holds between severity of symptoms and dosage of the drug. It thus becomes clear that a clinical syndrome, to all appearance of 'organic' class, is nought else than the expression of dynamic and transient alterations in function attributable to experimental toxicosis. And it is doubtless legitimate to argue, as is here done, that the phenomena of catatonia in man similarly represent a dynamic as opposed to a static condition, whose basis may be assumed to be of a toxic kind.

To all who seek the interpretation of so-called mental symptoms in disturbances of known or unknown neural systems a study of this nature, established on objective experimentation, must prove illuminating. On the other hand, it is equally important not to lose sight of the possibility that derangement of a neural system may be conditioned in one set of circumstances by say a toxic element and in another by excitants of a psychical order. But this at least may be said, that 'psychomotor' accompaniments of the major psychoses lose something of their mysteriousness when they can be reproduced at will in the laboratory animal.

**Abdominal Pain.** By JOHN MORLEY, Ch.M., F.R.C.S., assistant surgeon. Manchester Royal Infirmary, etc. Edinburgh; E. and S. Livingstone, 1931. Pp. 191. Price 10s. 6d. net.

THE accepted theory—or at least that which has seemed to consort best with clinical data—of viscero-muscular and viscero-cutaneous reflexes to account

for the superficial pain and muscular rigidity of certain abdominal affections is submitted by Mr. Morley to destructive criticism, and if not demolished, it reels at his onslaught indisputably. Mr. Morley discards in toto the hypothesis of reference from a visceral to a cerebrospinal neural mechanism (does he not go a little too far in affirming that there is no histological evidence for the precise connexion between autonomic and cerebrospinal afferent nerves which the theory assumes ? Is not there a neural continuum in regard to the former and anatomical linking so far as concerns the spinal part of the two ?), and feels himself justified, from long consideration of the facts of observation, in advancing a counter theory. This is to the effect that deep and superficial tenderness in abdominal cases, together with muscular rigidity of the abdominal wall, has nothing to do with visceral reflexes but is a referred phenomenon from the highly sensitive cerebrospinal nerves of the parietal peritoneum. Splanchnic and somatic mechanisms of abdominal pain he admits ' work marvellously together in many morbid processes ' (how so, if not physiologically and therefore anatomically ?) but they are aroused by stimuli of different orders, vary in their evolutionary place, and are ' fundamentally separate in origin and function.' Because of this ' profound difference,' the theory of a radiation of pain through the splanchnic to the somatic nerve is ' highly improbable,' and in Mr. Morley's contention not supported by clinical observation.

It is always salutary to have accepted views revised and remodelled, and, it may be, abandoned, when they are shown to accord ill with objective reality. Whether the thesis here engagingly set forth will itself stand testing remains to be seen ; the least to say in its favour is, that it demands serious investigation.

**Treatment of Epilepsy.** By Dr. FRITZ B. TALBOT, clinical professor of pædiatrics, Harvard University Medical School. London ; Cassell & Co. 1931. Pp. 308. Price 18s. net.

MUCH has been heard in recent years of ketosis and of the serviceableness of a ketogenic diet in epilepsy of unknown origin. By definition, ketosis is characterised by the presence of acetone, $\beta$-oxybutyric and diacetic acids in in the blood, in excess ; and it can be produced by a variety of conditions, such as infections, fasting, diets of a high fat and low carbohydrate content, cyclical vomiting, diabetes mellitus, etc. For therapeutic purposes in epilepsy fasting and modification of diet in the above-mentioned way have been resorted to with very fair success.

All the fundamentals of the method are to be found in this useful book, which is thoroughly scientific in spirit and sound in practice. The fullest details are supplied for application in given cases ; the hazards and intricacies of the regime are not ignored. Disappointing results are examined with patience and the factors leading thereto evaluated. Dietary tables furnish

the reader with information of the most practical kind. In the judgement of Professor Talbot, the ketogenic procedure has been tried now for a sufficiently long time to justify its inclusion among the more recent treatments of a troublesome affection, and if hitherto the best results have been obtained in children it would none the less appear to be of wider applicability.

**La Myotonie Atrophique.** By Dr. LUCIEN ROUQUES, Paris. Paris; A. Legrand. 1931. Pp. 229. Price not stated.

DR. LUCIEN ROUQUES has written an excellent thesis on the still obscure malady now usually known as dystrophia myotonica, although he employs the older appellation. Nor is it easy to understand why the term 'Steinert's disease' should also be suggested by the author, for he is well aware of adequate descriptions of the condition antedating that of Steinert by a number of years.

From the purely documentary standpoint the monograph is replete with clinical and pathological information; to the eight existing autopsy records the author is able to add a ninth, in considerable detail. However elaborate such clinico-pathological investigations may be, it cannot be said that they lead to the secret of the affection, for the discovery of which other methods must be utilised. Dr. Rouques is of the opinion that the disease should be classed with the general category of dystrophies, represented at one extreme by myotonia congenita and at the other by ordinary myopathy. Discarding any pathogenic role played by the endocrine glands, he would seek the intimate cause in disorder of the 'general trophic centres,' by which are to be understood 'extrapyramidal formations' and 'intracranial vegetative nuclei.' Of such a view it may perhaps be remarked with truth that, on the whole, it raises fewer difficulties than it dispels.

The appended bibliography is unusually complete.

**Die Beginnende Paralyse.** By Dr. HANS BURGER-PRINZ, University of Cologne. Berlin; Julius Springer. 1931. Pp. 86. Price RM. 7.80.

THE aim of the writer of this slender monograph is to ascertain whether it is possible, from consideration of their early clinical syndromes, to determine which cases of general paralysis are likely to benefit by malarial treatment. With this end in view 56 cases have been selected and their condition before and after fever therapy critically compared. Contrary to an opinion expressed by Bostroem, the writer finds that those commencing with depressive and hypomanic symptoms react badly and their prognosis is not good. Best results are obtained from the type of case grouped as 'asthenic,' 'exhausted,' 'stupid,' and from those with somatic manifestations. Attention is called to the circumstance that these have little or nothing to do, psychologically speaking, with the demented variety. The least favourable type is that in which 'organic' syndromes coupled with dementia occupy the clinical foreground.

A study of this kind serves a useful purpose and helps to crystallise knowledge in respect of choice of case for malarial cures.

**Encephalitis Lethargica; its Sequelæ and Treatment.** By C. VON ECONOMO, Vienna. Translated and adapted by K. O. NEWMAN, M.D. With 21 illustrations. London: Oxford Medical Publications. 1931. Pp. 200. Price 18s. net.

DR. NEWMAN has given the English-reading profession an excellent translation of the comprehensive monograph of Professor v. Economo, written in 1929, dealing with epidemic encephalitis. Professor v. Economo was the first neurologist on the continent to recognise the relative novelty of the affection which made its appearance in Austria in 1917 and from the very commencement he has continued to be one of its foremost investigators. Thus the book under review comes from the pen of an authority and can be cordially recommended as constituting an admirable exposé of all that is known in connexion therewith, complete with indices and bibliography.

**Diagnostic et Thérapeutique Électro-radiologiques des Maladies du Système Nerveux.** By A. ZIMMERN, professeur agrégé, Faculty of Medicine, Paris, and J. A. CHAVANY, chef de clinique, Faculty of Medicine, Paris. Paris; Masson et Cie. 1931. Pp. 654. Price 120 fr.

IN these days increasing attention is being paid to the radiology of the nervous system, and no case of brain or cord lesion in which compression is a possible diagnosis can be thought completely examined without resort to X-ray study. Nervous symptomatology stands to gain in precision of meaning when the adjuvants provided by 'electro-radiology' are taken advantage of. The new science and practice of chronaxy have added materially to that precision, and every year more use is being made of X-ray refinements. These several advances are well described in the volume under review, which, in the section devoted to cerebral tumours (for example), gives the student of neurology an excellent idea of the wealth of information to be gained thereby. Although many points receive annotation, it is perhaps a little curious that no figures are reproduced of calcification in meningeal venous angiomata, and only one of calcareous deposition in a growth (for which the abandoned term 'gliosarcoma' is here employed). 'Pineal shift' is referred to but not illustrated. Osteitis fibrosa of the cranium is pictured, but not Paget's disease, which is if anything less rare. Ventriculography and encephalography are adequately discussed.

A large part of the book is devoted to the electrical treatment of a long series of nervous diseases, and radiotherapy here receives commendable notice, consonant with the prominent place it now occupies. On the other hand, sections dealing with the application of radium ('curiethérapie') seem by comparison rather too concise, not to say superficial. Only a few lines are allowed for the radium treatment of intracranial growths—and this we consider a regrettable omission in so modern a treatise,

**The Pattern of Life.** By ALFRED ADLER, Vienna. Edited by W. BÉRAN WOLFE, M.D. London; Kegan Paul & Co. 1931. Pp. 271. Price 8s. 6d.

IN essence Dr. Adler's latest contribution to the subject of neurosis consists of some dozen case-histories of 'problem children' and of a series of comments from his pen on the incidents of each case which in his opinion serve as pointers to the stages in neurosis-formation. Each, further, is amplified by a little question-and-answer discussion conducted when the child involved was brought before him for consideration. For some reason or other this method of presentation, at second hand as it were, tends to diminish the impressiveness of the study, possibly because of difficulty experienced by the reader in reconstructing the atmosphere of the 'conferences.' Yet it would perhaps be troublesome to find any other to prove superior. Dr. Adler's words of advice seem all too brief in a given case, and his belief that 'we have put a new idea into his head' is unsupported by further history of the progress of the patient. After all, such value as these pages hold resides less in the substance than in the manner of the examinations, and the physician occupied with concrete cases of the kind will readily appreciate the kindliness, insight, and firmness manifested by Dr. Adler in his handling of 'difficult children.'

**Fortschritte der Sexualwissenschaft and Psychanalyse.** Edited by Dr. WILHELM STEKEL. Volume IV. Leipzig and Vienna: Franz Deuticke. 1931. Price RM. 15.

THE fourth volume in the series contains a number of articles of clinical interest, three of which are devoted to questions of analysis in general practice, in town and country. Dr. Bircher narrates a case of epilepsy treated by psychoanalytical procedures. Compulsion neuroses are also discussed in two papers. Dr. Stekel himself indulges once more in a brief personal allusion to the relations between Freud and himself, and to the differences in their respective views of analytic treatment. 'Ohne Freud wären Adler, Jung, und ich unmöglich gewesen,' but, as Nietzsche said, 'Man dankt einem Lehrer schlecht, wenn man nicht über ihn hinauswächst.'

**Psychoanalytische Praxis.** A Quarterly for the active methods of psychoanalysis. Edited by Dr. WILHELM STEKEL, Vienna. Leipzig: S. Hirzel, 1931. Pp. 48.

A NEW quarterly devoted to the psychoanalytic methods of Dr. Stekel and those who follow his teaching has appeared. It contains a series of short and readable articles on the technique of psychoanalysis, the dream as the barometer of the analytic situation, analysis of a case of dyspareunia, parapathia and phimosis, curiosities in analytic practice, and others. The journal promises well and will no doubt appeal to its readers.